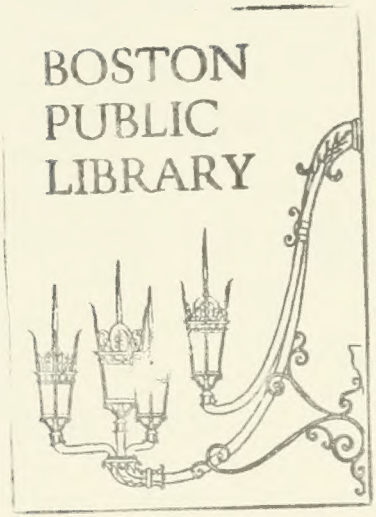
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SOUTH END TENANT HOUSING III

CONSTRUCTION, RENOVATION, AND REMODELLING

OF

MULTIPLE RESIDENTIAL LOCATIONS

BOSTON, MASSACHUSETTS

BIND

STULL AND LEE, INC.
ARCHITECT

SOUTH END
S933
1985

PROJECT MANUAL

NOVEMBER, 1985

SOUTH END TENANT HOUSING III

CONSTRUCTION OF
400 MASSACHUSETTS AVENUE

RENOVATION AND REMODELLING OF
395 - 397 MASSACHUSETTS AVENUE
588 MASSACHUSETTS AVENUE
69-81 EAST BERKELEY STREET

BOSTON, MASSACHUSETTS

OWNER: TENANT DEVELOPMENT CORP.
663 Massachusetts Avenue
Boston, Massachusetts 02118
617/445-8317

ARCHITECT: STULL AND LEE, INC.
100 Boylston Street
Boston, Massachusetts 02116
617/426-0406

STRUCTURAL ENGINEER: RENE MUGNIER & ASSOCIATES, INC.
63 Prentiss Street
Cambridge, Massachusetts 02140
617/354-3890

ELECTRICAL ENGINEER: GOODALL SHAPIRO & ASSOCIATES
100 Boylston Street
Boston, Massachusetts 02116
617/482-9635

MECHANICAL ENGINEER: SAM LESBURG & ASSOCIATES
100 Boylston Street
Boston, Massachusetts 02116
617/482-3855

LANDSCAPE ARCHITECT: DOUGLAS B. FOOTIT & ASSOCIATES
75 Kneeland Street
Boston, Massachusetts 02111
617/542-6699

ARCHITECTURAL SPECIFICATIONS CONSULTANT: SPEC-EDIT, INC.
29 Barton Street
Somerville, Massachusetts 02144
617/292-6420 - 305/447-2885

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PROJECT NO. 8306 11/85

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8306
S+L

BIDDING REQUIREMENTS

CONTRACT FORMS
and CONDITIONS of the CONTRACT

DOCUMENT 00700

GENERAL CONDITIONS

PART 1 GENERAL

1.01 DESCRIPTION

A. AIA Document A201, General Conditions of the Contract for Construction, Thirteenth Edition, August 1976, 19 pages.

B. Document is bound as part of this Project Manual.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

- END OF DOCUMENT -

THE AMERICAN INSTITUTE OF ARCHITECTS

AIA Document A201

General Conditions of the Contract for Construction

THIS DOCUMENT HAS IMPORTANT LEGAL CONSEQUENCES; CONSULTATION WITH AN ATTORNEY IS ENCOURAGED WITH RESPECT TO ITS MODIFICATION

1976 EDITION

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ARTICLE 1

CONTRACT DOCUMENTS

1.1 DEFINITIONS SEE SUPPLEMENTARY

1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents consist of the Owner-Contractor Agreement, the Conditions of the Contract (General, Supplementary and other Conditions), the Drawings, the Specifications, and all Addenda issued prior to and all Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a written interpretation issued by the Architect pursuant to Subparagraph 2.2.8, or (4) a written order for a minor change in the Work issued by the Architect pursuant to Paragraph 12.4. The Contract Documents do not include Bidding Documents such as the Advertisement or Invitation to Bid, the Instructions to Bidders, sample forms, the Contractor's Bid or portions of Addenda relating to any of these, or any other documents, unless specifically enumerated in the Owner-Contractor Agreement.

1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. This Contract represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification as defined in Subparagraph 1.1.1. The Contract Documents shall not be construed to create any contractual relationship of any kind between the Architect and the Contractor, but the Architect shall be entitled to performance of obligations intended for his benefit, and to enforcement thereof. Nothing contained in the Contract Documents shall create any contractual relationship between the Owner or the Architect and any Subcontractor or Sub-subcontractor.

1.1.3 THE WORK

The Work comprises the completed construction required by the Contract Documents and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated in such construction.

1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part.

1.2 EXECUTION, CORRELATION AND INTENT SEE SUPPLEMENTARY

1.2.1 The Contract Documents shall be signed in not less than triplicate by the Owner and Contractor. If either the Owner or the Contractor or both do not sign the Conditions of the Contract, Drawings, Specifications, or any of the other Contract Documents, the Architect shall identify such Documents.

1.2.2 By executing the Contract, the Contractor represents that he has visited the site, familiarized himself with the local conditions under which the Work is to be performed, and correlated his observations with the requirements of the Contract Documents.

1.2.3 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work. The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all. Work not covered in the Contract Documents will not be required unless it is consistent therewith and is reasonably inferable therefrom as being necessary to produce the intended results. Words and abbreviations which have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings.

1.2.4 The organization of the Specifications into divisions, sections and articles, and the arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

1.3 OWNERSHIP AND USE OF DOCUMENTS

1.3.1 All Drawings, Specifications and copies thereof furnished by the Architect are and shall remain his property. They are to be used only with respect to this Project and are not to be used on any other project. With the exception of one contract set for each party to the Contract, such documents are to be returned or suitably accounted for to the Architect on request at the completion of the Work. Submission or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's common law copyright or other reserved rights.

ARTICLE 2

ARCHITECT

2.1 DEFINITION

2.1.1 The Architect is the person lawfully licensed to practice architecture, or an entity lawfully practicing architecture identified as such in the Owner-Contractor Agreement, and is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term Architect means the Architect or his authorized representative.

2.2 ADMINISTRATION OF THE CONTRACT

2.2.1 The Architect will provide administration of the Contract as hereinafter described.

2.2.2 The Architect will be the Owner's representative during construction and until final payment is due. The Architect will advise and consult with the Owner. The Owner's instructions to the Contractor shall be forwarded

through the Architect. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified by written instrument in accordance with Subparagraph 2.2.18.

2.2.3 The Architect will visit the site at intervals appropriate to the stage of construction to familiarize himself generally with the progress and quality of the Work and to determine in general if the Work is proceeding in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of his on-site observations as an architect, he will keep the Owner informed of the progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work of the Contractor.

2.2.4 The Architect will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, and he will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Architect will not be responsible for or have control or charge over the acts or omissions of the Contractor, Subcontractors, or any of their agents or employees, or any other persons performing any of the Work.

2.2.5 The Architect shall at all times have access to the Work wherever it is in preparation and progress. The Contractor shall provide facilities for such access so the Architect may perform his functions under the Contract Documents.

2.2.6 Based on the Architect's observations and an evaluation of the Contractor's Applications for Payment, the Architect will determine the amounts owing to the Contractor and will issue Certificates for Payment in such amounts, as provided in Paragraph 9.4.

2.2.7 The Architect will be the interpreter of the requirements of the Contract Documents and the judge of the performance thereunder by both the Owner and Contractor.

2.2.8 The Architect will render interpretations necessary for the proper execution or progress of the Work, with reasonable promptness and in accordance with any time limit agreed upon. Either party to the Contract may make written request to the Architect for such interpretations.

2.2.9 Claims, disputes and other matters in question between the Contractor and the Owner relating to the execution or progress of the Work or the interpretation of the Contract Documents shall be referred initially to the Architect for decision which he will render in writing within a reasonable time.

2.2.10 All interpretations and decisions of the Architect shall be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. In his capacity as interpreter and judge, he will endeavor to secure faithful performance by both the Owner and the Contractor, will not show partiality to either, and will not be liable for the result of any interpretation or decision rendered in good faith in such capacity.

2.2.11 The Architect's decisions in matters relating to artistic effect will be final if consistent with the intent of the Contract Documents.

2.2.12 Any claim, dispute or other matter in question between the Contractor and the Owner referred to the Architect, except those relating to artistic effect as provided in Subparagraph 2.2.11 and except those which have been waived by the making or acceptance of final payment as provided in Subparagraphs 9.9.4 and 9.9.5, shall be subject to arbitration upon the written demand of either party. However, no demand for arbitration of any such claim, dispute or other matter may be made until the earlier of (1) the date on which the Architect has rendered a written decision, or (2) the tenth day after the parties have presented their evidence to the Architect or have been given a reasonable opportunity to do so, if the Architect has not rendered his written decision by that date. When such a written decision of the Architect states (1) that the decision is final but subject to appeal, and (2) that any demand for arbitration of a claim, dispute or other matter covered by such decision must be made within thirty days after the date on which the party making the demand receives the written decision, failure to demand arbitration within said thirty days' period will result in the Architect's decision becoming final and binding upon the Owner and the Contractor. If the Architect renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence but will not supersede any arbitration proceedings unless the decision is acceptable to all parties concerned.

2.2.13 The Architect will have authority to reject Work which does not conform to the Contract Documents. Whenever, in his opinion, he considers it necessary or advisable for the implementation of the intent of the Contract Documents, he will have authority to require special inspection or testing of the Work in accordance with Subparagraph 7.7.2 whether or not such Work be then fabricated, installed or completed. However, neither the Architect's authority to act under this Subparagraph 2.2.13, nor any decision made by him in good faith either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the Architect to the Contractor, any Subcontractor, any of their agents or employees, or any other person performing any of the Work.

2.2.14 The Architect will review and approve or take other appropriate action upon Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for conformance with the design concept of the Work and with the information given in the Contract Documents. Such action shall be taken with reasonable promptness so as to cause no delay. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

2.2.15 The Architect will prepare Change Orders in accordance with Article 12, and will have authority to order minor changes in the Work as provided in Subparagraph 12.4.1.

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2.2.16 The Architect will conduct inspections to determine the dates of Substantial Completion and final completion, will receive and forward to the Owner for the Owner's review written warranties and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate for Payment upon compliance with the requirements of Paragraph 9.9.

2.2.17 If the Owner and Architect agree, the Architect will provide one or more Project Representatives to assist the Architect in carrying out his responsibilities at the site. The duties, responsibilities and limitations of authority of any such Project Representative shall be as set forth in an exhibit to be incorporated in the Contract Documents.

2.2.18 The duties, responsibilities and limitations of authority of the Architect as the Owner's representative during construction as set forth in the Contract Documents will not be modified or extended without written consent of the Owner, the Contractor and the Architect.

2.2.19 In case of the termination of the employment of the Architect, the Owner shall appoint an architect against whom the Contractor makes no reasonable objection whose status under the Contract Documents shall be that of the former architect. Any dispute in connection with such appointment shall be subject to arbitration.

ARTICLE 3

OWNER

3.1 DEFINITION

3.1.1 The Owner is the person or entity identified as such in the Owner-Contractor Agreement and is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term Owner means the Owner or his authorized representative.

3.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

3.2.1 The Owner shall, at the request of the Contractor, at the time of execution of the Owner-Contractor Agreement, furnish to the Contractor reasonable evidence that he has made financial arrangements to fulfill his obligations under the Contract. Unless such reasonable evidence is furnished, the Contractor is not required to execute the Owner-Contractor Agreement or to commence the Work.

3.2.2 The Owner shall furnish all surveys describing the physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site.

3.2.3 Except as provided in Subparagraph 4.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for the construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

3.2.4 Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness to avoid delay in the orderly progress of the Work.

3.2.5 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, all copies of Drawings and Specifications reasonably necessary for the execution of the Work.

3.2.6 The Owner shall forward all instructions to the Contractor through the Architect.

3.2.7 The foregoing are in addition to other duties and responsibilities of the Owner enumerated herein and especially those in respect to Work by Owner or by Separate Contractors, Payments and Completion, and Insurance in Articles 6, 9 and 11 respectively.

3.3 OWNER'S RIGHT TO STOP THE WORK

3.3.1 If the Contractor fails to correct defective Work as required by Paragraph 13.2 or persistently fails to carry out the Work in accordance with the Contract Documents, the Owner, by a written order signed personally or by an agent specifically so empowered by the Owner in writing, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Subparagraph 6.1.3.

3.4 OWNER'S RIGHT TO CARRY OUT THE WORK

3.4.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within seven days after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, after seven days following receipt by the Contractor of an additional written notice and without prejudice to any other remedy he may have, make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and the amount charged to the Contractor are both subject to the prior approval of the Architect. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

ARTICLE 4

CONTRACTOR

4.1 DEFINITION

4.1.1 The Contractor is the person or entity identified as such in the Owner-Contractor Agreement and is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term Contractor means the Contractor or his authorized representative.

4.2 REVIEW OF CONTRACT DOCUMENTS

4.2.1 The Contractor shall carefully study and compare the Contract Documents and shall at once report to the Architect any error, inconsistency or omission he may discover. The Contractor shall not be liable to the Owner or

the Architect for any damage resulting from any such errors, inconsistencies or omissions in the Contract Documents. The Contractor shall perform no portion of the Work at any time without Contract Documents or, where required, approved Shop Drawings, Product Data or Samples for such portion of the Work.

4.3 SUPERVISION AND CONSTRUCTION PROCEDURES

4.3.1 The Contractor shall supervise and direct the Work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract.

4.3.2 The Contractor shall be responsible to the Owner for the acts and omissions of his employees, Subcontractors and their agents and employees, and other persons performing any of the Work under a contract with the Contractor.

4.3.3 The Contractor shall not be relieved from his obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of the Architect in his administration of the Contract, or by inspections, tests or approvals required or performed under Paragraph 7.7 by persons other than the Contractor.

4.4 LABOR AND MATERIALS SEE SUPPLEMENTARY

4.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

4.4.2 The Contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on the Work any unfit person or anyone not skilled in the task assigned to him.

4.5 WARRANTY

4.5.1 The Contractor warrants to the Owner and the Architect that all materials and equipment furnished under this Contract will be new unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Contract Documents. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. This warranty is not limited by the provisions of Paragraph 13.2.

4.6 TAXES

4.6.1 The Contractor shall pay all sales, consumer, use and other similar taxes for the Work or portions thereof provided by the Contractor which are legally enacted at the time bids are received, whether or not yet effective.

4.7 PERMITS, FEES AND NOTICES

4.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and for all other permits and governmental fees, licenses and inspections necessary for the proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required at the time the bids are received.

4.7.2 The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance of the Work.

4.7.3 It is not the responsibility of the Contractor to make certain that the Contract Documents are in accordance with applicable laws, statutes, building codes and regulations. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, he shall promptly notify the Architect in writing, and any necessary changes shall be accomplished by appropriate Modification.

4.7.4 If the Contractor performs any Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Architect, he shall assume full responsibility therefor and shall bear all costs attributable thereto.

4.8 ALLOWANCES

4.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by these allowances shall be supplied for such amounts and by such persons as the Owner may direct, but the Contractor will not be required to employ persons against whom he makes a reasonable objection.

4.8.2 Unless otherwise provided in the Contract Documents:

- .1 these allowances shall cover the cost to the Contractor, less any applicable trade discount, of the materials and equipment required by the allowance delivered at the site, and all applicable taxes;
- .2 the Contractor's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the original allowance shall be included in the Contract Sum and not in the allowance;
- .3 whenever the cost is more than or less than the allowance, the Contract Sum shall be adjusted accordingly by Change Order, the amount of which will recognize changes, if any, in handling costs on the site, labor, installation costs, overhead, profit and other expenses.

4.9 SUPERINTENDENT

4.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during the progress of the Work. The superintendent shall represent the Contractor and all communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be so confirmed on written request in each case.

4.10 PROGRESS SCHEDULE

4.10.1 The Contractor, immediately after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information an estimated progress sched-

ule for the Work. The progress schedule shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

4.11 DOCUMENTS AND SAMPLES AT THE SITE

4.11.1 The Contractor shall maintain at the site for the Owner one record copy of all Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record all changes made during construction, and approved Shop Drawings, Product Data and Samples. These shall be available to the Architect and shall be delivered to him for the Owner upon completion of the Work.

4.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES SEE SUPPLEMENTARY

4.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or any Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

4.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the Work.

4.12.3 Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

4.12.4 The Contractor shall review, approve and submit, with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of the Owner or any separate contractor, all Shop Drawings, Product Data and Samples required by the Contract Documents.

4.12.5 By approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

4.12.6 The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data or Samples under Subparagraph 2.2.14 unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Architect's approval thereof.

4.12.7 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than those requested by the Architect on previous submittals.

4.12.8 No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been approved by the Architect as provided in Subparagraph 2.2.14. All such portions of the Work shall be in accordance with approved submittals.

4.13 USE OF SITE SEE SUPPLEMENTARY

4.13.1 The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with any materials or equipment.

4.14 CUTTING AND PATCHING OF WORK

4.14.1 The Contractor shall be responsible for all cutting, fitting or patching that may be required to complete the Work or to make its several parts fit together properly.

4.14.2 The Contractor shall not damage or endanger any portion of the Work or the work of the Owner or any separate contractors by cutting, patching or otherwise altering any work, or by excavation. The Contractor shall not cut or otherwise alter the work of the Owner or any separate contractor except with the written consent of the Owner and of such separate contractor. The Contractor shall not unreasonably withhold from the Owner or any separate contractor his consent to cutting or otherwise altering the Work.

4.15 CLEANING UP

4.15.1 The Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. At the completion of the Work he shall remove all his waste materials and rubbish from and about the Project as well as all his tools, construction equipment, machinery and surplus materials.

4.15.2 If the Contractor fails to clean up at the completion of the Work, the Owner may do so as provided in Paragraph 3.4 and the cost thereof shall be charged to the Contractor.

4.16 COMMUNICATIONS

4.16.1 The Contractor shall forward all communications to the Owner through the Architect.

4.17 ROYALTIES AND PATENTS

4.17.1 The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Owner harmless from loss on account thereof, except that the Owner shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified, but if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Architect.

4.18 INDEMNIFICATION

4.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom,

and (2) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this Paragraph 4.18.

4.18.2 In any and all claims against the Owner or the Architect or any of their agents or employees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Paragraph 4.18 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

4.18.3 The obligations of the Contractor under this Paragraph 4.18 shall not extend to the liability of the Architect, his agents or employees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications, or (2) the giving of or the failure to give directions or instructions by the Architect, his agents or employees provided such giving or failure to give is the primary cause of the injury or damage.

ARTICLE 5

SUBCONTRACTORS

5.1 DEFINITION

5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform any of the Work at the site. The term Subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Subcontractor or his authorized representative. The term Subcontractor does not include any separate contractor or his subcontractors.

5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform any of the Work at the site. The term Sub-subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Sub-subcontractor or an authorized representative thereof.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 Unless otherwise required by the Contract Documents or the Bidding Documents, the Contractor, as soon as practicable after the award of the Contract, shall furnish to the Owner and the Architect in writing the names of the persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each of the principal portions of the Work. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or Architect to reply promptly shall constitute notice of no reasonable objection.

5.2.2 The Contractor shall not contract with any such proposed person or entity to whom the Owner or the Architect has made reasonable objection under the provisions of Subparagraph 5.2.1. The Contractor shall not be required to contract with anyone to whom he has a reasonable objection.

5.2.3 If the Owner or the Architect has reasonable objection to any such proposed person or entity, the Contractor shall submit a substitute to whom the Owner or the Architect has no reasonable objection, and the Contract Sum shall be increased or decreased by the difference in cost occasioned by such substitution and an appropriate Change Order shall be issued; however, no increase in the Contract Sum shall be allowed for any such substitution unless the Contractor has acted promptly and responsively in submitting names as required by Subparagraph 5.2.1.

5.2.4 The Contractor shall make no substitution for any Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

5.3 SUBCONTRACTUAL RELATIONS

5.3.1 By an appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these Documents, assumes toward the Owner and the Architect. Said agreement shall preserve and protect the rights of the Owner and the Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that the subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the Contractor-Subcontractor agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with his Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the Subcontract, copies of the Contract Documents to which the Subcontractor will be bound by this Paragraph 5.3, and identify to the Subcontractor any terms and conditions of the proposed Subcontract which may be at variance with the Contract Documents. Each Subcontractor shall similarly make copies of such Documents available to his Sub-subcontractors.

ARTICLE 6

WORK BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM WORK AND TO AWARD SEPARATE CONTRACTS

6.1.1 The Owner reserves the right to perform work related to the Project with his own forces, and to award

separate contracts in connection with other portions of the Project or other work on the site under these or similar Conditions of the Contract. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, he shall make such claim as provided elsewhere in the Contract Documents.

6.1.2 When separate contracts are awarded for different portions of the Project or other work on the site, the term Contractor in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

6.1.3 The Owner will provide for the coordination of the work of his own forces and of each separate contractor with the Work of the Contractor, who shall cooperate therewith as provided in Paragraph 6.2.

6.2 MUTUAL RESPONSIBILITY

6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall connect and coordinate his Work with theirs as required by the Contract Documents.

6.2.2 If any part of the Contractor's Work depends for proper execution or results upon the work of the Owner or any separate contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the Architect any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acceptance of the Owner's or separate contractors' work as fit and proper to receive his Work, except as to defects which may subsequently become apparent in such work by others.

6.2.3 Any costs caused by defective or ill-timed work shall be borne by the party responsible therefor.

6.2.4 Should the Contractor wrongfully cause damage to the work or property of the Owner, or to other work on the site, the Contractor shall promptly remedy such damage as provided in Subparagraph 10.2.5.

6.2.5 Should the Contractor wrongfully cause damage to the work or property of any separate contractor, the Contractor shall upon due notice promptly attempt to settle with such other contractor by agreement, or otherwise to resolve the dispute. If such separate contractor sues or initiates an arbitration proceeding against the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor who shall defend such proceedings at the Owner's expense, and if any judgment or award against the Owner arises therefrom the Contractor shall pay or satisfy it and shall reimburse the Owner for all attorneys' fees and court or arbitration costs which the Owner has incurred.

6.3 OWNER'S RIGHT TO CLEAN UP

6.3.1 If a dispute arises between the Contractor and separate contractors as to their responsibility for cleaning up as required by Paragraph 4.15, the Owner may clean up and charge the cost thereof to the contractors responsible therefor as the Architect shall determine to be just.

ARTICLE 7

MISCELLANEOUS PROVISIONS

7.1 GOVERNING LAW SEE SUPPLEMENTARY

7.1.1 The Contract shall be governed by the law of the place where the Project is located.

7.2 SUCCESSORS AND ASSIGNS

7.2.1 The Owner and the Contractor each binds himself, his partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party in respect to all covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other, nor shall the Contractor assign any moneys due or to become due to him hereunder, without the previous written consent of the Owner.

7.3 WRITTEN NOTICE

7.3.1 Written notice shall be deemed to have been duly served if delivered in person to the individual or member of the firm or entity or to an officer of the corporation for whom it was intended, or if delivered at or sent by registered or certified mail to the last business address known to him who gives the notice.

7.4 CLAIMS FOR DAMAGES

7.4.1 Should either party to the Contract suffer injury or damage to person or property because of any act or omission of the other party or of any of his employees, agents or others for whose acts he is legally liable, claim shall be made in writing to such other party within a reasonable time after the first observance of such injury or damage.

7.5 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

7.5.1 The Owner shall have the right to require the Contractor to furnish bonds covering the faithful performance of the Contract and the payment of all obligations arising thereunder if and as required in the Bidding Documents or in the Contract Documents.

7.6 RIGHTS AND REMEDIES

7.6.1 The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

7.6.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

7.7 TESTS

7.7.1 If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any portion of the Work to be inspected, tested or approved, the Contractor shall give the Architect timely notice of its readiness so the Architect may observe such inspection, testing or approval. The Contractor shall bear all costs of such inspections, tests or approvals conducted by public authorities. Unless otherwise provided, the Owner shall bear all costs of other inspections, tests or approvals.

7.7.2 If the Architect determines that any Work requires special inspection, testing, or approval which Subparagraph 7.7.1 does not include, he will, upon written authorization from the Owner, instruct the Contractor to order such special inspection, testing or approval, and the Contractor shall give notice as provided in Subparagraph 7.7.1. If such special inspection or testing reveals a failure of the Work to comply with the requirements of the Contract Documents, the Contractor shall bear all costs thereof, including compensation for the Architect's additional services made necessary by such failure; otherwise the Owner shall bear such costs, and an appropriate Change Order shall be issued.

7.7.3 Required certificates of inspection, testing or approval shall be secured by the Contractor and promptly delivered by him to the Architect.

7.7.4 If the Architect is to observe the inspections, tests or approvals required by the Contract Documents, he will do so promptly and, where practicable, at the source of supply.

7.8 INTEREST

7.8.1 Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing at the place of the Project.

7.9 ARBITRATION

7.9.1 All claims, disputes and other matters in question between the Contractor and the Owner arising out of, or relating to, the Contract Documents or the breach thereof, except as provided in Subparagraph 2.2.11 with respect to the Architect's decisions on matters relating to artistic effect, and except for claims which have been waived by the making or acceptance of final payment as provided by Subparagraphs 9.9.4 and 9.9.5, shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then obtaining unless the parties mutually agree otherwise. No arbitration arising out of or relating to the Contract Documents shall include, by consolidation, joinder or in any other manner, the Architect, his employees or consultants except by written consent containing a specific reference to the Owner-Contractor Agreement and signed by the Architect, the Owner, the Contractor and any other person sought to be joined. No arbitration shall include by consolidation, joinder or in any other manner, parties other than the Owner, the Contractor and any other persons substantially involved in a common question of fact or law, whose presence is required if complete relief is to be accorded in the arbitration. No person other than the Owner or Contractor shall be included as an original third party or additional third party to an arbitration whose interest or responsibility is insubstantial. Any consent to arbitration involving an additional person or persons shall not constitute consent to arbitration of any dispute not described therein or with any person not named or described therein. The foregoing agreement to arbitrate and any other agreement to arbitrate with an additional person or persons duly consented to by the parties to the Owner-Contractor Agreement shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

7.9.2 Notice of the demand for arbitration shall be filed in writing with the other party to the Owner-Contractor Agreement and with the American Arbitration Association, and a copy shall be filed with the Architect. The demand for arbitration shall be made within the time limits specified in Subparagraph 2.2.12 where applicable, and in all other cases within a reasonable time after the claim, dispute or other matter in question has arisen, and in no event shall it be made after the date when institution of legal or equitable proceedings based on such claim, dispute or other matter in question would be barred by the applicable statute of limitations.

7.9.3 Unless otherwise agreed in writing, the Contractor shall carry on the Work and maintain its progress during any arbitration proceedings, and the Owner shall continue to make payments to the Contractor in accordance with the Contract Documents.

ARTICLE 8

TIME

8.1 DEFINITIONS

8.1.1 Unless otherwise provided, the Contract Time is the period of time allotted in the Contract Documents for Substantial Completion of the Work as defined in Subparagraph 8.1.3, including authorized adjustments thereto.

8.1.2 The date of commencement of the Work is the date established in a notice to proceed. If there is no notice to proceed, it shall be the date of the Owner-Contractor Agreement or such other date as may be established therein.

8.1.3 The Date of Substantial Completion of the Work or designated portion thereof is the Date certified by the Architect when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for the use for which it is intended.

8.1.4 The term day as used in the Contract Documents shall mean calendar day unless otherwise specifically designated.

8.2 PROGRESS AND COMPLETION

8.2.1 All time limits stated in the Contract Documents are of the essence of the Contract.

8.2.2 The Contractor shall begin the Work on the date of commencement as defined in Subparagraph 8.1.2. He shall carry the Work forward expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 If the Contractor is delayed at any time in the progress of the Work by any act or neglect of the Owner or the Architect, or by any employee of either, or by any separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in transportation, adverse weather conditions not reasonably anticipatable, unavoidable casualties, or any causes beyond the Contractor's control, or by delay authorized by the Owner pending arbitration, or by any other cause which the Architect determines may justify the delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

8.3.2 Any claim for extension of time shall be made in writing to the Architect not more than twenty days after the commencement of the delay; otherwise it shall be waived. In the case of a continuing delay only one claim is necessary. The Contractor shall provide an estimate of the probable effect of such delay on the progress of the Work.

8.3.3 If no agreement is made stating the dates upon which interpretations as provided in Subparagraph 2.2.8 shall be furnished, then no claim for delay shall be allowed on account of failure to furnish such interpretations until fifteen days after written request is made for them, and not then unless such claim is reasonable.

8.3.4 This Paragraph 8.3 does not exclude the recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9

PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

9.1.1 The Contract Sum is stated in the Owner-Contractor Agreement and, including authorized adjustments thereto, is the total amount payable by the Owner to the Contractor for the performance of the Work under the Contract Documents.

9.2 SCHEDULE OF VALUES

9.2.1 Before the first Application for Payment, the Contractor shall submit to the Architect a schedule of values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used only as a basis for the Contractor's Applications for Payment.

9.3 APPLICATIONS FOR PAYMENT

9.3.1 At least ten days before the date for each progress payment established in the Owner-Contractor Agreement, the Contractor shall submit to the Architect an itemized Application for Payment, notarized if required, supported by such data substantiating the Contractor's right to payment as the Owner or the Architect may require, and reflecting retainage, if any, as provided elsewhere in the Contract Documents.

9.3.2 Unless otherwise provided in the Contract Documents, payments will be made on account of materials or equipment not incorporated in the Work but delivered and suitably stored at the site and, if approved in advance by the Owner, payments may similarly be made for materials or equipment suitably stored at some other location agreed upon in writing. Payments for materials or equipment stored on or off the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials or equipment or otherwise protect the Owner's interest, including applicable insurance and transportation to the site for those materials and equipment stored off the site.

9.3.3 The Contractor warrants that title to all Work, materials and equipment covered by an Application for Payment will pass to the Owner either by incorporation in the construction or upon the receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests or encumbrances, hereinafter referred to in this Article 9 as "liens"; and that no Work, materials or equipment covered by an Application for Payment will have been acquired by the Contractor, or by any other person performing Work at the site or furnishing materials and equipment for the Project, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.

9.4 CERTIFICATES FOR PAYMENT

9.4.1 The Architect will, within seven days after the receipt of the Contractor's Application for Payment, either issue a Certificate for Payment to the Owner, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor in writing his reasons for withholding a Certificate as provided in Subparagraph 9.6.1.

9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on his observations at the site as provided in Subparagraph 2.2.3 and the data comprising the Application for Payment, that the Work has progressed to the point indicated; that, to the best of his knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to the results of any subsequent tests required by or performed under the Contract Documents, to minor deviations from the Contract Documents correctable prior to completion, and to any specific qualifications stated in his Certificate); and that the Contractor is entitled to payment in the amount certified. However, by issuing a Certificate for Payment, the Architect shall not thereby be deemed to represent that he has made exhaustive or continuous on-site inspections to check the quality or quantity of the Work or that he has reviewed the construction means, methods, techniques,

sequences or procedures, or that he has made any examination to ascertain how or for what purpose the Contractor has used the moneys previously paid on account of the Contract Sum.

9.5 PROGRESS PAYMENTS

9.5.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents.

9.5.2 The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's Work, the amount to which said Subcontractor is entitled, reflecting the percentage actually retained, if any, from payments to the Contractor on account of such Subcontractor's Work. The Contractor shall, by an appropriate agreement with each Subcontractor, require each Subcontractor to make payments to his Subsubcontractors in similar manner.

9.5.3 The Architect may, on request and at his discretion, furnish to any Subcontractor, if practicable, information regarding the percentages of completion or the amounts applied for by the Contractor and the action taken thereon by the Architect on account of Work done by such Subcontractor.

9.5.4 Neither the Owner nor the Architect shall have any obligation to pay or to see to the payment of any moneys to any Subcontractor except as may otherwise be required by law.

9.5.5 No Certificate for a progress payment, nor any progress payment, nor any partial or entire use or occupancy of the Project by the Owner, shall constitute an acceptance of any Work not in accordance with the Contract Documents.

9.6 PAYMENTS WITHHELD

9.6.1 The Architect may decline to certify payment and may withhold his Certificate in whole or in part, to the extent necessary reasonably to protect the Owner, if in his opinion he is unable to make representations to the Owner as provided in Subparagraph 9.4.2. If the Architect is unable to make representations to the Owner as provided in Subparagraph 9.4.2 and to certify payment in the amount of the Application, he will notify the Contractor as provided in Subparagraph 9.4.1. If the Contractor and the Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which he is able to make such representations to the Owner. The Architect may also decline to certify payment or, because of subsequently discovered evidence or subsequent observations, he may nullify the whole or any part of any Certificate for Payment previously issued, to such extent as may be necessary in his opinion to protect the Owner from loss because of:

.1 defective work not remedied,
.2 third party claims filed or reasonable evidence indicating probable filing of such claims,
.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment,
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum,
.5 damage to the Owner or another contractor,
.6 reasonable evidence that the Work will not be completed within the Contract Time, or
.7 persistent failure to carry out the Work in accordance with the Contract Documents.

9.6.2 When the above grounds in Subparagraph 9.6.1 are removed, payment shall be made for amounts withheld because of them.

9.7 FAILURE OF PAYMENT

9.7.1 If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents any amount certified by the Architect or awarded by arbitration, then the Contractor may, upon seven additional days' written notice to the Owner and the Architect, stop the Work until payment of the amount owing has been received. The Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, which shall be effected by appropriate Change Order in accordance with Paragraph 12.3.

9.8 SUBSTANTIAL COMPLETION

9.8.1 When the Contractor considers that the Work, or a designated portion thereof which is acceptable to the Owner, is substantially complete as defined in Subparagraph 8.1.3, the Contractor shall prepare for submission to the Architect a list of items to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. When the Architect on the basis of an inspection determines that the Work or designated portion thereof is substantially complete, he will then prepare a Certificate of Substantial Completion which shall establish the Date of Substantial Completion, shall state the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance, and shall fix the time within which the Contractor shall complete the items listed therein. Warranties required by the Contract Documents shall commence on the Date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and the Contractor for their written acceptance of the responsibilities assigned to them in such Certificate.

9.8.2 Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the Architect, the Owner shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof, as provided in the Contract Documents.

9.9 FINAL COMPLETION AND FINAL PAYMENT

9.9.1 Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will

promptly make such inspection and, when he finds the Work acceptable under the Contract Documents and the Contract fully performed, he will promptly issue a final Certificate for Payment stating that to the best of his knowledge, information and belief, and on the basis of his observations and inspections, the Work has been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor, and noted in said final Certificate, is due and payable. The Architect's final Certificate for Payment will constitute a further representation that the conditions precedent to the Contractor's being entitled to final payment as set forth in Subparagraph 9.9.2 have been fulfilled.

9.9.2 Neither the final payment nor the remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or his property might in any way be responsible, have been paid or otherwise satisfied, (2) consent of surety, if any, to final payment and (3), if required by the Owner, other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens arising out of the Contract, to the extent and in such form as may be designated by the Owner. If any Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify him against any such lien. If any such lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all moneys that the latter may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

9.9.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by the issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than the retainage stipulated in the Contract Documents, and if bonds have been furnished as provided in Paragraph 7.5, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

9.9.4 The making of final payment shall constitute a waiver of all claims by the Owner except those arising from:

- **.1** unsettled liens,
- **.2** faulty or defective Work appearing after Substantial Completion,
- **.3** failure of the Work to comply with the requirements of the Contract Documents, or
- **.4** terms of any special warranties required by the Contract Documents.

9.9.5 The acceptance of final payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of the final Application for Payment.

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1 The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:

- **.1** all employees on the Work and all other persons who may be affected thereby;
- **.2** all the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of his Subcontractors or Sub-subcontractors; and
- **.3** other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

10.2.2 The Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.

10.2.3 The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

10.2.4 When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

10.2.5 The Contractor shall promptly remedy all damage or loss (other than damage or loss insured under Paragraph 11.3) to any property referred to in Clauses 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, any Subcontractor, any Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable and for which the Contractor is responsible under Clauses 10.2.1.2 and 10.2.1.3, except damage or loss attributable to the acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to his obligations under Paragraph 4.18.

10.2.6 The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and the Architect.

10.2.7 The Contractor shall not load or permit any part of the Work to be loaded so as to endanger its safety.

10.3 EMERGENCIES

10.3.1 In any emergency affecting the safety of persons or property, the Contractor shall act, at his discretion, to prevent threatened damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency work shall be determined as provided in Article 12 for Changes in the Work.

ARTICLE 11

INSURANCE

11.1 CONTRACTOR'S LIABILITY INSURANCE

SEE SUPPLEMENTARY

11.1.1 The Contractor shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the Contractor's operations under the Contract, whether such operations be by himself or by any Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 claims under workers' or workmen's compensation, disability benefit and other similar employee benefit acts;

.2 claims for damages because of bodily injury, occupational sickness or disease, or death of his employees;

.3 claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;

.4 claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person;

.5 claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom; and

.6 claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

11.1.2 The insurance required by Subparagraph 11.1.1 shall be written for not less than any limits of liability specified in the Contract Documents, or required by law, whichever is greater.

11.1.3 The insurance required by Subparagraph 11.1.1 shall include contractual liability insurance applicable to the Contractor's obligations under Paragraph 4.18.

11.1.4 Certificates of Insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work. These Certificates shall contain a provision that coverages afforded under the policies will not be cancelled until at least thirty days' prior written notice has been given to the Owner.

11.2 OWNER'S LIABILITY INSURANCE

11.2.1 The Owner shall be responsible for purchasing and maintaining his own liability insurance and, at his option, may purchase and maintain such insurance as will protect him against claims which may arise from operations under the Contract.

11.3 PROPERTY INSURANCE

SEE SUPPLEMENTARY

11.3.1 Unless otherwise provided, the Owner shall purchase and maintain property insurance upon the entire Work at the site to the full insurable value thereof. This insurance shall include the interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Work and shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, theft, vandalism and malicious mischief. If the Owner does not intend to purchase such insurance for the full insurable value of the entire Work, he shall inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance which will protect the interests of himself, his Subcontractors and the Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by failure of the Owner to purchase or maintain such insurance and to so notify the Contractor, then the Owner shall bear all reasonable costs properly attributable thereto. If not covered under the all risk insurance or otherwise provided in the Contract Documents, the Contractor shall effect and maintain similar property insurance on portions of the Work stored off the site or in transit when such portions of the Work are to be included in an Application for Payment under Subparagraph 9.3.2.

11.3.2 The Owner shall purchase and maintain such boiler and machinery insurance as may be required by the Contract Documents or by law. This insurance shall include the interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Work.

11.3.3 Any loss insured under Subparagraph 11.3.1 is to be adjusted with the Owner and made payable to the Owner as trustee for the insureds, as their interests may appear, subject to the requirements of any applicable mortgagee clause and of Subparagraph 11.3.8. The Contractor shall pay each Subcontractor a just share of any insurance moneys received by the Contractor, and by appropriate agreement, written where legally required for validity, shall require each Subcontractor to make payments to his Sub-subcontractors in similar manner.

11.3.4 The Owner shall file a copy of all policies with the Contractor before an exposure to loss may occur.

11.3.5 If the Contractor requests in writing that insurance for risks other than those described in Subparagraphs 11.3.1 and 11.3.2 or other special hazards be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

11.3.6 The Owner and Contractor waive all rights against (1) each other and the Subcontractors, Sub-subcontractors, agents and employees each of the other, and (2) the Architect and separate contractors, if any, and their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other perils to the extent covered by insurance obtained pursuant to this Paragraph 11.3 or any other property insurance applicable to the Work, except such rights as they may have to the proceeds of such insurance held by the Owner as trustee. The foregoing waiver afforded the Architect, his agents and employees shall not extend to the liability imposed by Subparagraph 4.18.3. The Owner or the Contractor, as appropriate, shall require of the Architect, separate contractors, Subcontractors and Sub-subcontractors by appropriate agreements, written where legally required for validity, similar waivers each in favor of all other parties enumerated in this Subparagraph 11.3.6.

11.3.7 If required in writing by any party in interest, the Owner as trustee shall, upon the occurrence of an insured loss, give bond for the proper performance of his duties. He shall deposit in a separate account any money so received, and he shall distribute it in accordance with such agreement as the parties in interest may reach, or in accordance with an award by arbitration in which case the procedure shall be as provided in Paragraph 7.9. If after such loss no other special agreement is made, replacement of damaged work shall be covered by an appropriate Change Order.

11.3.8 The Owner as trustee shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within five days after the occurrence of loss to the Owner's exercise of this power, and if such objection be made, arbitrators shall be chosen as provided in Paragraph 7.9. The Owner as trustee shall, in that case, make settlement with the insurers in accordance with the directions of such arbitrators. If distribution of the insurance proceeds by arbitration is required, the arbitrators will direct such distribution.

11.3.9 If the Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion thereof, such occupancy or use shall not commence prior to a time mutually agreed to by the Owner and Contractor and to which the insurance company or companies providing the property insurance have consented by endorsement to the policy or policies. This insurance shall not be cancelled or lapsed on account of such partial occupancy or use. Consent of the Contractor and of the insurance company or companies to such occupancy or use shall not be unreasonably withheld.

11.4 LOSS OF USE INSURANCE

11.4.1 The Owner, at his option, may purchase and maintain such insurance as will insure him against loss of use of his property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of his property, including consequential losses due to fire or other hazards however caused, to the extent covered by insurance under this Paragraph 11.4.

ARTICLE 12

CHANGES IN THE WORK

12.1 CHANGE ORDERS

12.1.1 A Change Order is a written order to the Contractor signed by the Owner and the Architect, issued after execution of the Contract, authorizing a change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time.

12.1.2 The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and the Contract Time being adjusted accordingly. All such changes in the Work shall be authorized by Change Order, and shall be performed under the applicable conditions of the Contract Documents.

12.1.3 The cost or credit to the Owner resulting from a change in the Work shall be determined in one or more of the following ways:

- **.1** by mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** by unit prices stated in the Contract Documents or subsequently agreed upon;
- **.3** by cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- **.4** by the method provided in Subparagraph 12.1.4.

12.1.4 If none of the methods set forth in Clauses 12.1.3.1, 12.1.3.2 or 12.1.3.3 is agreed upon, the Contractor, provided he receives a written order signed by the Owner, shall promptly proceed with the Work involved. The cost of such Work shall then be determined by the Architect on the basis of the reasonable expenditures and savings of those performing the Work attributable to the change, including, in the case of an increase in the Contract Sum, a reasonable allowance for overhead and profit. In such case, and also under Clauses 12.1.3.3 and 12.1.3.4 above, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data for inclusion in a Change Order. Unless otherwise provided in the Contract Documents, cost shall be limited to the following: cost of materials, including sales tax and cost of delivery; cost of labor, including social security, old age and unemployment insurance, and fringe benefits required by agreement or custom; workers' or workmen's compensation insurance; bond premiums; rental value of equipment and machinery; and the additional costs of supervision and field office personnel directly attributable to the change. Pending final determination of cost to the Owner, payments on account shall be made on the Architect's Certificate for Payment. The amount of credit to be allowed by the Contractor to the Owner for any deletion

or change which results in a net decrease in the Contract Sum will be the amount of the actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase, if any, with respect to that change.

12.1.5 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if the quantities originally contemplated are so changed in a proposed Change Order that application of the agreed unit prices to the quantities of Work proposed will cause substantial inequity to the Owner or the Contractor, the applicable unit prices shall be equitably adjusted.

12.2 CONCEALED CONDITIONS

12.2.1 Should concealed conditions encountered in the performance of the Work below the surface of the ground or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the Contract Documents, or should unknown physical conditions below the surface of the ground or should concealed or unknown conditions in an existing structure of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract, be encountered, the Contract Sum shall be equitably adjusted by Change Order upon claim by either party made within twenty days after the first observance of the conditions.

12.3 CLAIMS FOR ADDITIONAL COST

12.3.1 If the Contractor wishes to make a claim for an increase in the Contract Sum, he shall give the Architect written notice thereof within twenty days after the occurrence of the event giving rise to such claim. This notice shall be given by the Contractor before proceeding to execute the Work, except in an emergency endangering life or property in which case the Contractor shall proceed in accordance with Paragraph 10.3. No such claim shall be valid unless so made. If the Owner and the Contractor cannot agree on the amount of the adjustment in the Contract Sum, it shall be determined by the Architect. Any change in the Contract Sum resulting from such claim shall be authorized by Change Order.

12.3.2 If the Contractor claims that additional cost is involved because of, but not limited to, (1) any written interpretation pursuant to Subparagraph 2.2.8, (2) any order by the Owner to stop the Work pursuant to Paragraph 3.3 where the Contractor was not at fault, (3) any written order for a minor change in the Work issued pursuant to Paragraph 12.4, or (4) failure of payment by the Owner pursuant to Paragraph 9.7, the Contractor shall make such claim as provided in Subparagraph 12.3.1.

12.4 MINOR CHANGES IN THE WORK

12.4.1 The Architect will have authority to order minor changes in the Work not involving an adjustment in the Contract Sum or an extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order, and shall be binding on the Owner and the Contractor. The Contractor shall carry out such written orders promptly.

ARTICLE 13

UNCOVERING AND CORRECTION OF WORK

13.1 UNCOVERING OF WORK

13.1.1 If any portion of the Work should be covered contrary to the request of the Architect or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Architect, be uncovered for his observation and shall be replaced at the Contractor's expense.

13.1.2 If any other portion of the Work has been covered which the Architect has not specifically requested to observe prior to being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work be found in accordance with the Contract Documents, the cost of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work be found not in accordance with the Contract Documents, the Contractor shall pay such costs unless it be found that this condition was caused by the Owner or a separate contractor as provided in Article 6, in which event the Owner shall be responsible for the payment of such costs.

13.2 CORRECTION OF WORK

13.2.1 The Contractor shall promptly correct all Work rejected by the Architect as defective or as failing to conform to the Contract Documents whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear all costs of correcting such rejected Work, including compensation for the Architect's additional services made necessary thereby.

13.2.2 If, within one year after the Date of Substantial Completion of the Work or designated portion thereof or within one year after acceptance by the Owner of designated equipment or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be defective or not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This obligation shall survive termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.

13.2.3 The Contractor shall remove from the site all portions of the Work which are defective or non-conforming and which have not been corrected under Subparagraphs 4.5.1, 13.2.1 and 13.2.2, unless removal is waived by the Owner.

13.2.4 If the Contractor fails to correct defective or non-conforming Work as provided in Subparagraphs 4.5.1, 13.2.1 and 13.2.2, the Owner may correct it in accordance with Paragraph 3.4.

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13.2.5 If the Contractor does not proceed with the correction of such defective or non-conforming Work within a reasonable time fixed by written notice from the Architect, the Owner may remove it and may store the materials or equipment at the expense of the Contractor. If the Contractor does not pay the cost of such removal and storage within ten days thereafter, the Owner may upon ten additional days' written notice sell such Work at auction or at private sale and shall account for the net proceeds thereof, after deducting all the costs that should have been borne by the Contractor, including compensation for the Architect's additional services made necessary thereby. If such proceeds of sale do not cover all costs which the Contractor should have borne, the difference shall be charged to the Contractor and an appropriate Change Order shall be issued. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

13.2.6 The Contractor shall bear the cost of making good all work of the Owner or separate contractors destroyed or damaged by such correction or removal.

13.2.7 Nothing contained in this Paragraph 13.2 shall be construed to establish a period of limitation with respect to any other obligation which the Contractor might have under the Contract Documents, including Paragraph 4.5 hereof. The establishment of the time period of one year after the Date of Substantial Completion or such longer period of time as may be prescribed by law or by the terms of any warranty required by the Contract Documents relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which his obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to his obligations other than specifically to correct the Work.

13.3 ACCEPTANCE OF DEFECTIVE OR NON-CONFORMING WORK

13.3.1 If the Owner prefers to accept defective or non-conforming Work, he may do so instead of requiring its removal and correction, in which case a Change Order will be issued to reflect a reduction in the Contract Sum where appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 14

TERMINATION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

14.1.1 If the Work is stopped for a period of thirty days under an order of any court or other public authority having jurisdiction, or as a result of an act of government, such as a declaration of a national emergency making materials unavailable, through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing any of the Work under a contract with the Contractor, or if the Work should be stopped for a period of thirty days by the Contractor because the Architect has not issued a Certificate for Payment as provided in Paragraph 9.7 or because the Owner has not made payment thereon as provided in Paragraph 9.7, then the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner payment for all Work executed and for any proven loss sustained upon any materials, equipment, tools, construction equipment and machinery, including reasonable profit and damages.

14.2 TERMINATION BY THE OWNER

SEE SUPPLEMENTARY

14.2.1 If the Contractor is adjudged a bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver is appointed on account of his insolvency, or if he persistently or repeatedly refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if he fails to make prompt payment to Subcontractors or for materials or labor, or persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise is guilty of a substantial violation of a provision of the Contract Documents, then the Owner, upon certification by the Architect that sufficient cause exists to justify such action, may, without prejudice to any right or remedy and after giving the Contractor and his surety, if any, seven days' written notice, terminate the employment of the Contractor and take possession of the site and of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever method he may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the Work is finished.

14.2.2 If the unpaid balance of the Contract Sum exceeds the costs of finishing the Work, including compensation for the Architect's additional services made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or to the Owner, as the case may be, shall be certified by the Architect, upon application, in the manner provided in Paragraph 9.4, and this obligation for payment shall survive the termination of the Contract.

DIVISION 1

GENERAL REQUIREMENTS

SECTION 01000

SOIL INVESTIGATION DATA

PART 1 GENERAL

1.01 INVESTIGATION

A. Soil and subsurface investigation were conducted at the jobsite, the results of which are to be found in the attached report.

B. The Contractor is urged to examine the soil investigation data.

1.02 INTERPRETATION

A. Soil investigation data is provided only for the information and convenience of the Contractor. The Owner and the Architect disclaim any responsibility for the accuracy, true location and extent of the soils investigation that has been prepared by others. The Owner and the Architect further disclaim responsibility for interpretation of the data by the Contractor as in projecting soil bearing values, rock profiles, soil stability and the presence, level and estent of underground water.

B. Soil investigation data is not part of the contract documents.

END OF SECTION

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(603) 882-3601

To Stull and Lee Date 8/21/85 Job No. 85-432

Location South End Tenant Housing, 400 Mass. Ave., Boston, MA Scale 1" = 6 ft.

Test Boring B-1
8/20/85

0'0"	Ground Surface	0'0"	
	Firm to hard, dry, fine sand, some brick, wood and other building debris, little fine to medium gravel and inorganic silt. (Fill.)	1'6"	17-6-8
		4'0"	
		5'6"	22-31-10
	(Possible concrete slab.)	8'5"	
8'8"	Refusal at 8'8" with hollow stem auger and 120/0" with 140# hammer.	8'8"	100/3"-120/0"

No water encountered upon completion.

Offset 5' to B-1A.

Test Boring B-1A

0'0"	Ground Surface	0'0"	
	Firm to hard, dry, fine sand, some brick, wood and other building debris, little fine to medium gravel and inorganic silt. (Fill.)	1'6"	2-22-7
		4'0"	
		5'0"	15-11-120/0"
7'3"	Refusal at 7'3" with hollow stem auger and 120/0" with 140# hammer.	7'3"	120/0"

No water encountered upon completion.

Offset 3' to B-1B.

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

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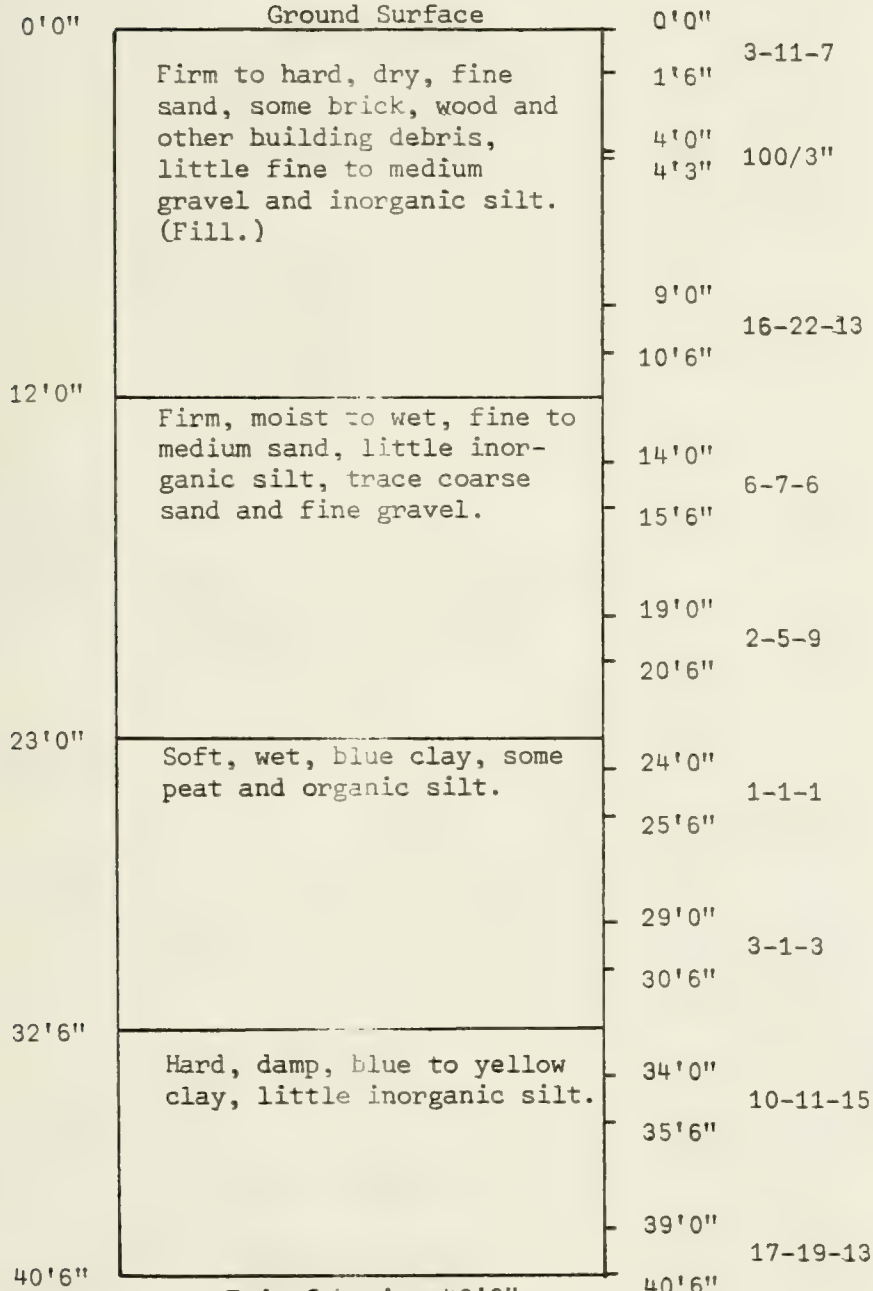
To Stull and Lee Date 8/21/85 Job No. 85-432

Location South End Tenant Housing,400 Mass. Ave.,Boston,MA Scale 1" = 6 ft.

Test Boring B-1B
8/20/85



End of boring 40'6"

Water level at 14'3"
upon completion.

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

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To Stull and Lee Date 8/21/85 Job No. 85-432

Location South End Tenant Housing,400 Mass.Ave., Boston,MA Scale 1" = 6 ft.

Test Boring B-2
8/19/85

0'0"	Ground Surface	0'0"		
	Firm to hard, dry, fine sand, some inorganic silt, medium to coarse sand, crushed brick and wood. (Fill.)	1'6"	7-9-7	
		4'6"	24-31-30	
7'0"		6'0"		
	Loose to compact, moist to wet, fine to medium sand, little inorganic silt and coarse sand, trace fine to coarse gravel.	9'6"	4-3-3	
		11'0"		
		14'6"	19-21-27	
17'6"		16'0"		
	Medium stiff to stiff, wet, blue clay, little organic silt and root matter.	19'6"	3-2-3	
		21'0"		
		24'6"	6-6-6	No recovery.
		26'0"	4-5-5	
28'0"		27'6"		
	Hard, wet, blue to yellow clay.	29'6"	12-15-19	
		31'0"		
		34'6"	15-21-14	
36'0"		36'0"		

End of boring 36'0"

Water level at 9'1"
upon completion.

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

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To Stull and Lee Date 8/21/85 Job No. 85-432

Location South End Housing, 400 Mass.Ave., Boston, MA Scale 1" = 6 ft.

Test Boring B-3
8/20/85

0'0"	Ground Surface		
	Loose, dry, fine sand, little inorganic silt, coarse sand and fine gravel. (Fill.)	0'0" – 1'6"	4-8-5
3'0"			
	Firm to hard, dry, fine to medium sand, some crushed brick, fine to medium gravel and wood.	4'0" – 5'6"	8-8-17
6'5"		6'5"	120/0"

Refusal at 6'5" with hollow stem auger and 120/0" with 140# hammer. (Possible concrete or granite slab.)

No water encountered upon completion.

Offset 5' to B-3A.

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%

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To Stull and Lee Date 8/21/85 Job No. 85-432

Location South End Tenant Housing, 400 Mass.Ave., Boston,MA Scale 1" = 6 ft.

Test Boring B-3A
8/20/85

0'0"	Ground Surface		
	Loose, dry, fine sand, little inorganic silt and fine gravel. (Fill.)	0'0"	
			3-11-5
2'0"		1'6"	
	Hard, dry, fine to medium sand, some crushed brick, cement, wood and fine to medium gravel, little ash, cinder and inorganic silt. (Fill.)	4'0"	
			13-33-10
7'0"		5'6"	
	Hard, dry to moist to wet, fine to medium sand, little inorganic silt, coarse sand and fine to medium gravel.	9'0"	
			15-21-15
		10'6"	
		14'0"	
		14'8"	18-60/2"
		19'0"	
		19'3"	100/3"
20'0"			
	Soft, wet, blue clay, some organic silt and peat.	24'0"	
			1-1-1
		25'6"	
		29'0"	
			2-2-2
31'0"		30'6"	
	Hard, damp, blue to yellow clay, little inorganic silt.	34'0"	
			16-16-18
		35'6"	
		39'0"	
			12-19-17
40'6"		40'6"	

End of boring 40'6"

Water level at 15'8"
upon completion.

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

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To Stull and Lee Date 8/21/85 Job No. 85-432

Location South End Tenant Housing, 400 Mass.Ave, Boston, MA Scale 1" = 6 ft.

Test Boring B-4
8/19/85

0'0"	Ground Surface	0'0"	
	Hard, dry, fine sand, some crushed brick, concrete and wood, little medium to coarse sand and fine gravel.	1'6"	5-17-6
		4'6"	
		5'4"	27-100/4"
8'2"		8'2"	120/0"

Refusal at 8'2" with hollow stem auger and 120/0" with 140# hammer.

No water encountered upon completion.

Offset 5' to B-4A.

Test Boring B-4A

0'0"	Ground Surface	0'0"	
	Loose to firm, dry, fine to medium sand, some brick, wood, concrete and other building debris.	0'9"	7-100/3"
		4'6"	21-10-60/1"
		5'7"	
		8'8"	120/3"
8'11"		8'11"	

Refusal at 8'11" with hollow stem auger.

No water encountered upon completion.

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

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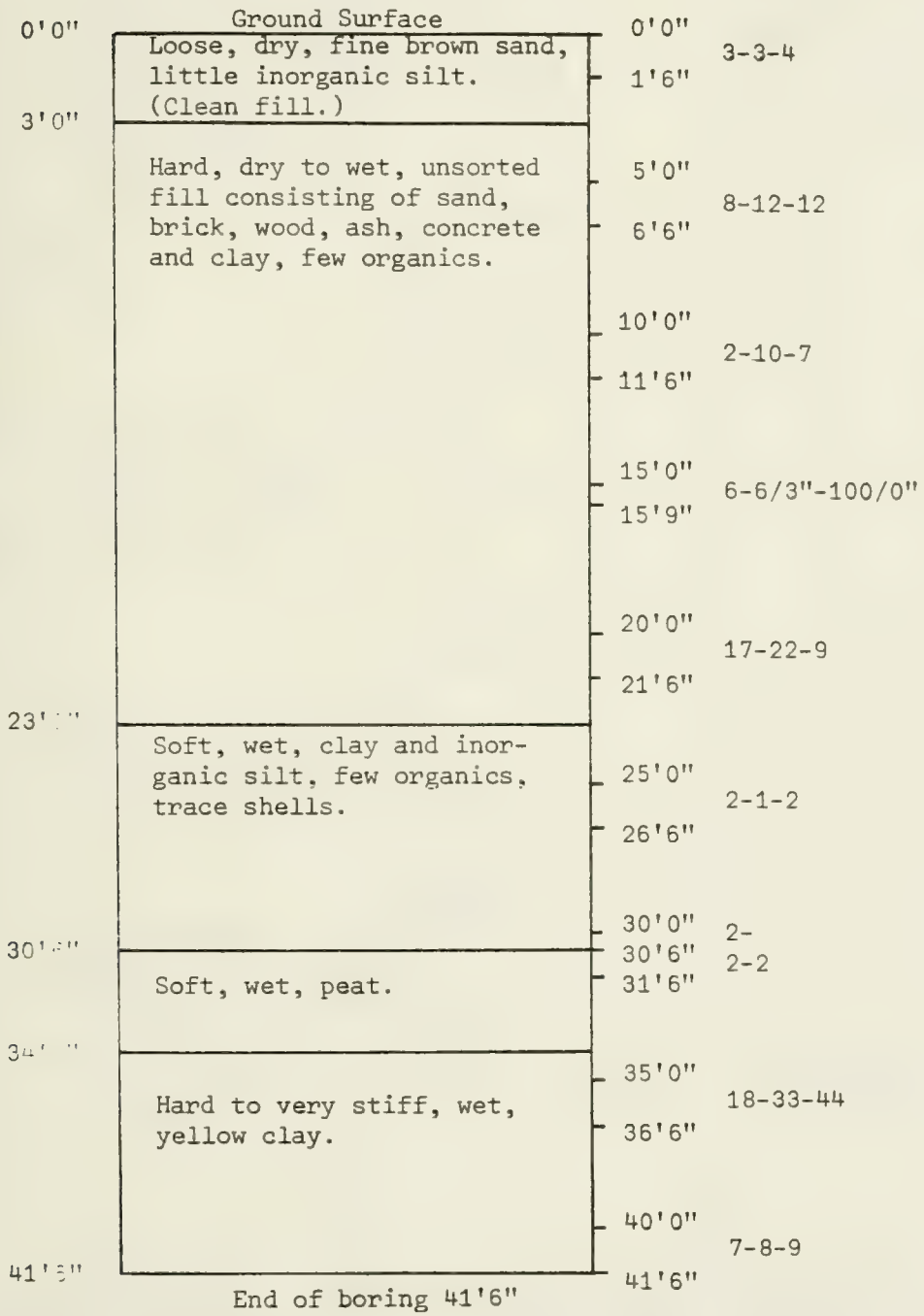
NASHUA, NH 03060
(603) 882-3601

To Stull & Lee Architects Date 10/11/85 Job No. 85-513

Location 400 Mass. Ave., South End Housing, Boston, MA Scale 1" - 6 ft.

Test Boring B-5
10/4/85



End of boring 41'6"

Water level at 12'0" upon completion.

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

425 TAYLOR ROAD
STOW, MASSACHUSETTS 01775
(617) 897-8737

SOIL EXPLORATION CORPORATION

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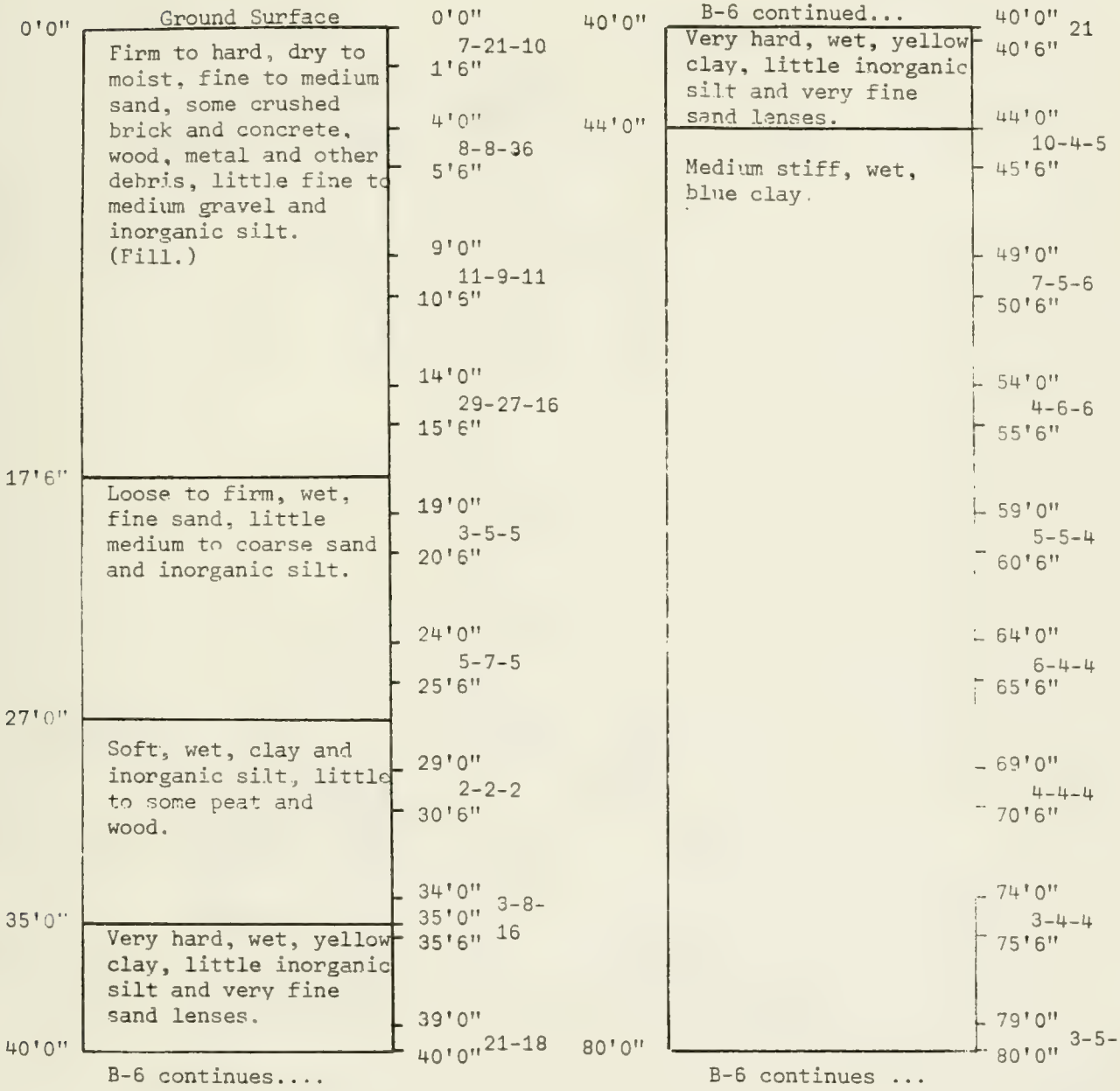
23 INGALLS STREET
NASHUA, NH 03060
(603) 882-3601

To Stull & Lee Architects Date 10/11/85 Job No. 85-513

Location 400 Mass. Ave., South End Housing, Boston, MA Scale 1" = 6 ft.

Test Boring B-6
10/4, 10/7/85



Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

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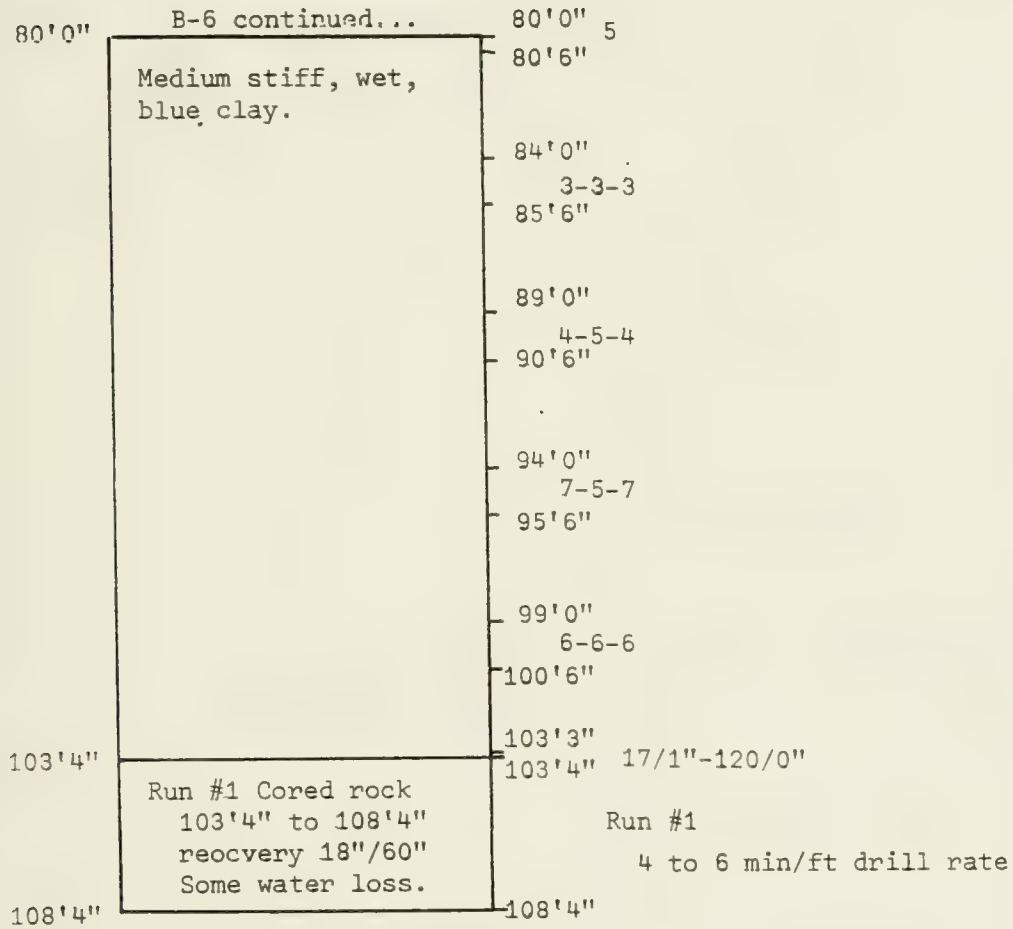
To Stull & Lee Architects Date 10/11/85 Job No. 85-513

Location 400 Mass. Ave., South End Housing, Boston, MA Scale 1" = 6 ft.



Refusal at 103'4"
120/0" with 140# hammer.

Water level at 10'3"
upon completion.

Note: B-6 offset 18' due to slope.

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

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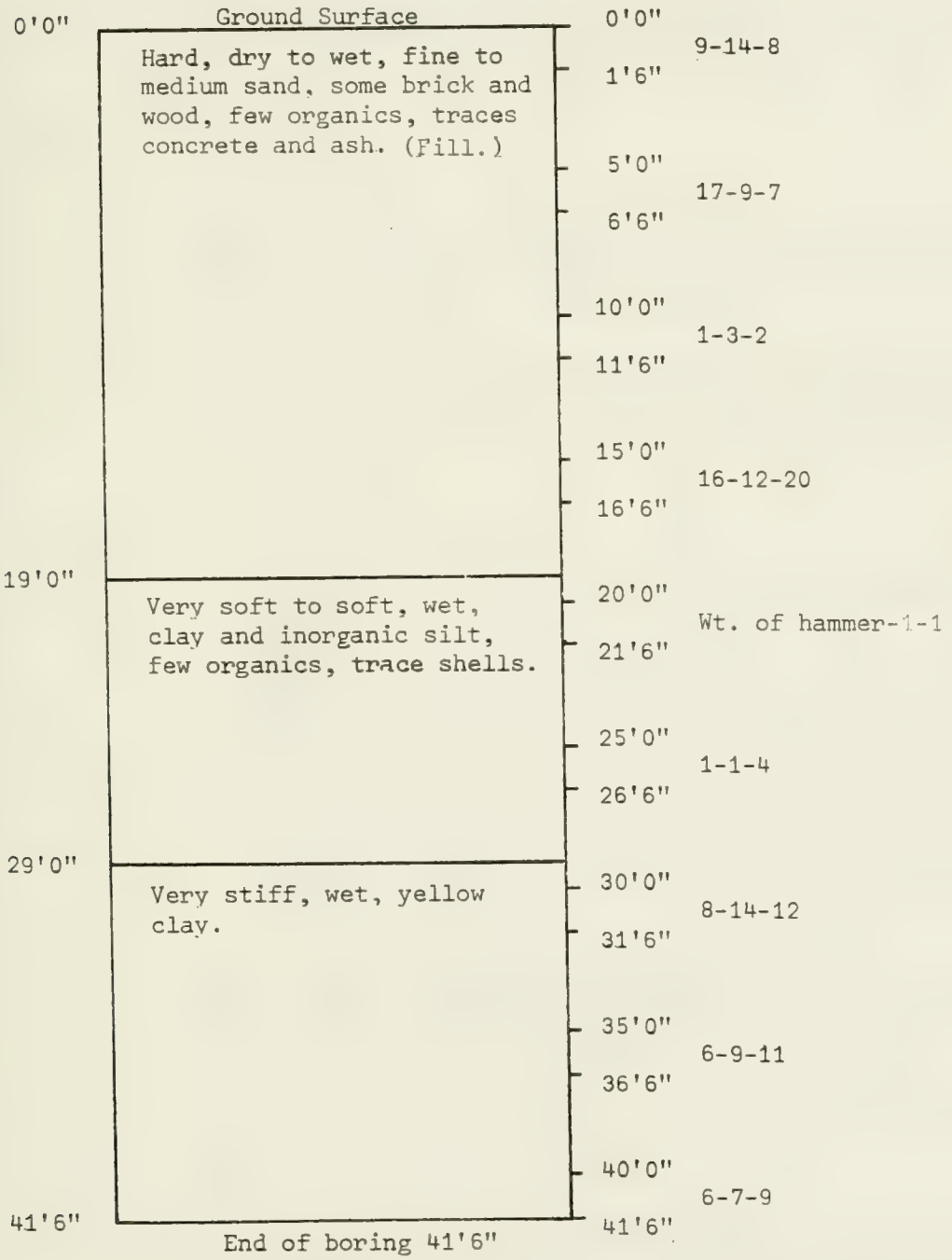
To Stull & Lee Architects Date 10/11/85 Job No. 85-513

Location 400 Mass. Ave., South End Housing, Boston, MA Scale 1" = 6 ft.

Test Boring B-7
10/4/85



Water level at 9'0"
upon completion.

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

SECTION 01005

SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of this Contract comprises general construction including mechanical and electrical, remodelling, renovation, demolition, of South End Tenant Housing III located at multiple locations in Boston, Massachusetts, for Owner.

1.02 COORDINATION

A. Coordinate work of various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.

B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Mechanical/Electrical:
1. Coordinate space requirements and installation of mechanical and electrical work indicated diagramatically on Drawings.
2. Follow routing shown for pipes, ducts, and conduits, as closely as practicable.
3. Make runs parallel with lines of building.
4. Utilize spaces efficiently to maximize accessibility for other installations, maintenance, and repairs.
5. In finished areas, except as otherwise shown, conceal pipes, ducts, and wiring in construction.
6. Coordinate locations of fixtures and outlets with finish elements.

D. Execute cutting and patching to integrate elements of Work, uncover ill-timed, defective, and non-conforming work, provide openings for penetrations of existing surfaces, and provide samples for testing.

E. Seal penetrations through floors, walls, and ceilings.

1.03 CONTRACTOR'S RESPONSIBILITIES:

A. Subcontractor Coordination:
1. Insure subcontractors are knowledgeable of all Sections of Division 1, General Requirements and are responsible for conforming to applicable requirements and instructions stated therein.

2. Assume responsibility for administering Work performed by subcontractors in accordance with Division 1, General Requirements.

B. Installation Sequencing:
   1. Examine materials and installations performed by others prior to starting next stage or adjacent work.
   2. Notify Architect immediately of unsatisfactory conditions which hinder or restrict correct installation of next stage or adjacent work.
   3. Start of next stage or adjacent work will be construed as acceptance of previous or adjacent work whether or not conditions are satisfactory.
   4. Any work requiring subsequent removal or replacement due to unsatisfactory or defective work shall not be at the expense of the Owner.

C. Contract Document Review:
   1. Prior to execution of Work, the Contractor shall review all Drawings and Specifications and shall immediately report all errors, discrepancies, and/or omissions discovered to the Architect, in writing, with one set of Contract Documents marked in red pencil, clearly indicating the discrepancies.
   2. Omissions from the Drawings and/or the Specifications or the misdescription of details of Work which are manifestly necessary to carry out the intent of the Drawings and Specifications, or are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the Work; but shall be performed as if set forth and described in the Drawings and Specifications, with final approval issued by the Architect to alleviate conflicts of scheduling, drawings, details, and/or specifications.
   3. Design Intent:
      a. Purpose of Drawings is to graphically depict characteristics and extent of Project.
      b. Specifications included as part of Project Manual, are provided to state material type, function, and source of materials.
      c. Reference standards are used in Specifications to describe, by inference, specific materials and may include recommended methods of installation or application based on industry standards.

1.04 FIELD ENGINEERING

A. Provide field engineering services; establish grades, lines, and levels, by use of recognized engineering survey practices.

B. Control datum for survey is that established by Owner-provided survey, shown on Drawings.

C. Locate and protect control and reference points.

1.05 REFERENCE STANDARDS

A. Compliance: Work for this Project shall conform to standards published by recognized professional and industry organizations when referenced in this Project Manual.

B. Edition Date of Reference Standards:
1. Code Listing: Any reference to standards of any society, institute, association, or governmental agency which is a part of the building code in effect for this Project shall comply with the edition date published in the referenced edition of the Building Code.
2. Non-Code Listing: Any reference to standards of any society, institute, association, or governmental agency which is not a part of the Building Code for this Project shall be the edition in effect at time of opening of Bids, except as otherwise specifically stated in this Project Manual.
3. Project Manual Listing: Edition dates listed with reference standards in each Section of this Project Manual are included for reference only.

C. If reference standards are revised prior to completion of any part of the Work to which such revision would pertain, the Contractor may, if acceptable to the Architect and if not in violation of the Building Code, perform such work in accordance with the revised specifications.

1.06 CODE ANALYSIS

A. The design and construction of Project shall conform to codes, laws, regulations, and ordinances of any kind required by governmental authority or other regulatory agency having jurisdiction over this Project and specifically:
1. Building: Massachusetts State Building Code - 1980.
2. Electrical: Massashusetts Electrical Code - 1984.
3. Fire Safety: Massachusetts State Building Code - 1984.
4. Life Safety: Massachusetts State Building Code - 1980.
5. Mechanical: BOCA Basic Mechanical Code - 1978.
6. Plumbing: Massachusetts State Plumbing and Gas Code.
7. Elevator: Massachusetts Elevator and Escalator Regulations, 105CMR:410-1978.

1.07 ABBREVIATIONS

A. Reference to a technical society, institution, associa-

tion, or governmental agency made in these Specifications is in accordance with the following abbreviations which are used throughout the Specifications:

AA	-	Aluminum Association.
AAMA	-	Architectural Aluminum Manufacturers Association.
ACI	-	American Concrete Institute.
AIA	-	American Institute of Architects.
ANSI	-	American National Standards Institute.
APA	-	American Plywood Association.
ASHRAE	-	American Society of Heating, Refrigeration & Air-Conditioning Engineers.
ASTM	-	American Society for Testing and Materials.
AWI	-	Architectural Woodwork Institute.
AWPA	-	American Wood Preservers Association.
AWPB	-	American Wood Preservers Bureau.
AWS	-	American Welding Society.
CRI	-	Carpet and Rug Institute.
CRSI	-	Concrete Reinforcing Steel Institute.
FGMA	-	Flat Glass Marketing Association.
FM	-	Factory Mutual System.
FS	-	Federal Specifications.
GA	-	Gypsum Association.
ML/SFA	-	Metal Lath/Steel Framing Association.
NAAMM	-	National Association of Architectural Metal Manufacturers.
NEMA	-	National Electrical Manufacturers' Association.
NFPA	-	National Fire Protection Association.
NWMA	-	National Woodwork Manufacturers Association.
OSHA	-	U.S. Department of Labor, Occupational Safety and Health Act Standards.
PS	-	U.S. Department of Commerce Product Standard.
RTI	-	Resilient Tile Institute.
SDI	-	Steel Door Institute.
SIGMA	-	Sealed Insulating Glass Manufacturers Association.
SMACNA	-	Sheet Metal & Air Conditioning Contractors National Association.
SPIB	-	Southern Pine Inspection Bureau.
SSPC	-	Steel Structures Painting Council.
TCA	-	Tile Council of America.
UL	-	Underwriters Laboratories.
USPS	-	United States Postal Service.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

- END OF SECTION -

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

1.01 GENERAL

A. Submit Shop Drawings, Product Data, and Samples required by Contract Documents.

B. Use only approved shop drawings, product data, and samples for field installation of any work which is designated as requiring submittals and approvals.

C. Related Requirements Specified Elsewhere:
1. Section 01005, Summary of Work.
2. Section 01600, Material and Equipment.
3. Division 2 through 16 inclusive.

1.02 SHOP DRAWINGS

A. Present in a clear and thorough manner.
1. Identify by reference to sheet and detail, schedule, or room numbers shown on Contract Drawings.

B. Minimum Sheet Size: 8-1/2 in. x 11 in.

1.03 PRODUCT DATA

A. Preparation:
1. Clearly mark each copy to identify pertinent products or models.
2. Show performance characteristics and capacities.
3. Show dimensions and clearances required.
4. Show wiring or piping diagrams and controls.

B. Manufacturer's Standard Schematic Drawings and Diagrams.
1. Modify Drawings and Diagrams to delete information not applicable to Work.
2. Supplement standard information to provide information specifically applicable to Work.

1.04 SAMPLES

A. Office samples shall be of sufficient size and quantity to clearly illustrate:
1. Functional characteristics of Products, with integrally related parts and attachment devices.
2. Full range of color, texture, and pattern.

B. Field Samples:
1. Erect, at Project site, at a location acceptable to Architect.

2. Size or Area: Refer to respective specification section.
3. Fabricate each sample complete and finished.

1.05 CONTRACTOR RESPONSIBILITIES

A. Review Shop Drawings, Product Data, and Samples prior to submission.

B. Determine and Verify:
1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.
4. Conformance with Specifications.

C. Coordinate each submittal with requirements of Work and of Contract Documents.

D. Notify Architect, in writing, at time of submission, of any deviations in submittals and clearly mark any deviations from requirements of Contract Documents.

E. Do not begin fabrication or work which requires submittals until return of submittals indicating action taken by Architect.
1. For substitutions, comply with requirements of Section 01600, Material and Equipment.
2. Substitutions will be reviewed by Architect only for acceptance or rejection.

F. Use only reviewed/stamped shop drawings for installation and/or fabrication of items.

1.06 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in Work, or in work of any other contractor.

B. Number of Submittals Required:
1. Shop Drawings: Submit number of opaque reproductions which Contractor requires, plus two copies to be retained by Architect.
2. Product Data: Submit number of copies which Contractor requires, plus two to be retained by Architect.
3. Samples: Submit number stated in each Specification Section.
4. Include Submittal Form appended as part of this Section (1 page) with each submittal to include information as detailed and specified in this Section.

1.07 RESUBMISSION REQUIREMENTS

A. Make any corrections or changes in submittals required by Architect and resubmit until reviewed with no excep-

tions taken.

B. Shop Drawings and Product Data:
   1. Revise initial drawings or data, and resubmit as specified for initial submittal.
   2. Indicate any changes which have been made other than those requested by Architect.

C. Samples: Submit new samples as required for initial submittal.

1.08 RESUBMISSION REVIEW FEES

A. Should Architect perform additional reviews due to incomplete or incorrect submittals made by Contractor:
   1. Owner will compensate Architect for such additional services.
   2. Owner will deduct amount of compensation from progress or final payments to Contractor.

1.09 DISTRIBUTION

A. Distribute reproductions of Shop Drawings and copies of Product Data which carry Architect's stamp to:
   1. Job site file.
   2. Record Documents file.
   3. Other affected contractors.
   4. Subcontractors.
   5. Supplier or Fabricator.

B. Distribute samples which carry Architect's stamp as directed by Architect.

1.10 ARCHITECT DUTIES

A. Review submittals with reasonable promptness and in accord with Schedule.

B. Affix stamp and initials or signature, and indicate requirements for resubmittal, or review of submittal.

C. Return submittals to Contractor for distribution, or resubmission.

D. Delays in returning submittals does not authorize Contractor to start work indicated on submittals.

E. Time Extensions:
   1. Contractor may be entitled to time extensions only necessary to maintain schedules as detailed if submittals are not returned with reasonable promptness.
   2. Extensions will not be authorized due to out-of-sequence or last minute submission of submittals necessary to perform Work.

PART 2 PRODUCTS Not Used.

- END OF SECTION -

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

SUBMITTAL FORM

DATE:
PREVIOUS SUBMISSION DATE:
PROJECT NO:
PROJECT:

CONTRACTOR:
SUPPLIER:
MANUFACTURER:
PRODUCT DESCRIPTION: MODEL NO:
SECTION NO. AND TITLE:

PRODUCT DEVIATIONS:

REVISION/RESUBMITTAL IDENTIFICATION:

ARCHITECT CONTRACTOR

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish, install, and maintain temporary facilities required for construction, remove on completion of Work to include.
   1. Building Safety.
   2. Electricity, Lighting.
   3. Heat, Ventilation.
   4. Telephone Service.
   5. Water.
   6. Barriers.
   7. Enclosures.
   8. Installed Work Protection.
   9. Cleaning During Construction.

B. Related Work:
   1. Section 01005, Summary of Work.

C. Building Safety:
   1. General:
      a. Provide protection of adjacent structures and building being renovated.
      b. Maintain protection to reduce risk of fire due to welding and cutting, temporary heating, smoking by contractor's employees, temporary wiring, and other electrical sources.
   2. Fire Controls: Coordinate as follows as a minimum:
      a. Use fire-resistant tarpaulins or other fire-retardant materials where temporary closures are used.
      b. Provide Class B fire extinguishers when welding, torch cutting, sweating pipe joints, or using flammable liquids powered equipment and maintain fire watch during use.
      c. Store all flammable liquids in safety cans, safety cabinets, and follow NFPA 30 Flammable and Combustible Liquids Code.
      d. Provide ventilation to prevent buildup of flammable atmosphere and post appropriate warning signs.
      e. Comply with ANSI 10.10-81, Safety Requirements for Temporary and Portable Space Heating Devices and Equipment.
      f. Prohibit debris accummulations and dispose of daily.
      g. Inspect job for smoldering fires and disconnection of temporary heating min. 1/2 hr. before quitting time.
   3. Electrical Safety:

a. Perform all temporary wiring using qualified electricians.
b. Periodically inspect portable equipment, lights, and cords for wear and abuse.

4. Warnings and Exits:
a. Post warning signs at doors, gates, and other entry points from occupied areas into construction areas.
b. Mark exit stairway and maintain clear of all obstructions.
c. Do not use any stairway for storage.

1.02 ELECTRICITY, LIGHTING

A. Provide service required for construction operations, with branch wiring and distribution boxes located to allow service and lighting by means of construction-type power cords.

B. Existing Service:
1. Connect to existing service, provide branch wiring and distribution boxes located to allow service and lighting by means of construction-type power cords.
2. Take measures to conserve energy.

C. Provide lighting for construction operations.

D. Existing and permanent lighting may be used during construction.

E. Maintain lighting and make routine repairs.

1.03 HEAT, VENTILATION

A. Provide as required to maintain specified conditions for construction operations, to protect materials and finishes from damage due to temperature or humidity.

B. Before operation of permanent facilities for temporary purposes, verify installation is approved for operation, and filters are in place.

C. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.

1.04 TELEPHONE SERVICE

A. Provide telephone service to field office.
1. Service required:
a. One direct line instrument in Field Office.
b. Other instruments at option of Contractor, or as required by regulations.
2. Pay all costs for installation, maintenance, and removal, and service charges for local calls.
3. Toll charges shall be paid by party who placed

call.

1.05 WATER

A. Provide service required for construction operations.

B. Extend branch piping with outlets located so water is available by use of hoses.

C. Existing Services:
   1. Connect to existing facilities; extend branch piping with outlets located so water is available by use of hoses.

1.06 BARRIERS

A. Provide as Required:
   1. To prevent public entry to construction areas.
   2. To provide for Owner's use of site.
   3. To protect existing facilities and adjacent properties from damage from construction operations.
   4. To protect against accidents to pedestrian and vehicular traffic without interrupting normal traffic flow.

B. Provide barricades and covered walkways as required by governing authorities for public rights-of-way and for public acess to existing building.

1.07 ENCLOSURES

A. Exterior:
   1. Provide temporary insulated weathertight closures of openings in exterior surfaces to provide acceptable working conditions and protection for materials, to allow for temporary heating, and to prevent entry of unauthorized persons.
   2. Provide doors with self-closing hardware and locks.

1.08 PROTECTION OF INSTALLED WORK

A. Provide temporary protection for installed products and control traffic in immediate area to minimize damage.

B. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

C. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.

D. Do not allow traffic and storage on waterproofed and roofed surfaces, on lawn and landscaped areas.

1.09 CLEANING DURING CONSTRUCTION

A. Control accumulation of waste materials and rubbish;

periodically dispose of off-site.

B. Clean interior areas before start of finish work, maintain areas free of dust and other contaminants during finishing operations.

1.10 REMOVAL

A. Remove temporary materials, equipment, services, and construction before Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities.

C. Remove underground installations to a depth of 2 ft.; grade site as indicated.

D. Restore existing facilities used during construction to specified, or original condition.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

- END OF SECTION -

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 GENERAL

A. Material and Equipment Incorporated Into Work:
   1. Conform to applicable specifications and standards.
   2. Comply with size, make, type, and quality specified, or as specifically approved in writing by Architect.
   3. Manufactured and Fabricated Products:
      a. Design, fabricate, and assemble in accord with best engineering and shop practices.
      b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
      c. Two or more items of same kind to be identical, by same manufacturer.
      d. Products to be suitable for service conditions.
      e. Equipment capacities, sizes, and dimensions shown or specified shall be adhered to unless variations are approved in writing.
   4. Do not use material or equipment for any purpose other than that for which it is designed or specified.

B. Related Work:
   1. Section 01005, Summary of Work.
   2. Section 01340, Shop Drawings, Product Data, and Samples.
   3. Division 2 through 16 inclusive.

C. Material and Installation:
   1. Unless otherwise specifically provided in Contract Documents, references to any equipment, material article, patented process, or installation and procedure by trade name, make or catalog number, shall be regarded as establishing a standard of quality.
   2. Previous statement shall not be construed as limiting competition, and the Contractor may use any equipment, material, or process which complies with quality stated as part of this Contract Document.
   3. Use of any equipment, material, or process not specifically named shall comply with requirements of this Section for Substitutions and Product Options.

1.02 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in installation, including

two copies to Architect.
1. Maintain one set of complete instructions at job site during installation and until completion.

B. Handle, install, connect, clean, condition, and adjust products in strict accord with such instructions and in conformity with specified requirements.
1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Architect for further instructions.
2. Do not proceed with work without clear instructions.

C. Perform work in accord with manufacturer's instructions.

D. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.03 TRANSPORTATION AND HANDLING

A. Arrange deliveries of Products in accord with construction schedules, coordinate to avoid conflict with work and conditions at site.
1. Deliver Products in undamaged conditions, in manufacturer's original containers or packaging, with identifying labels intact and legible.
2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and Products are properly protected and undamaged.

B. Provide equipment and personnel to handle Products by methods to prevent soiling or damage to Products or packaging.

1.04 STORAGE AND PROTECTION

A. Store Products in accord with manufacturer's instructions, with seals and labels intact and legible.
1. Store products subject to damage by elements in weathertight enclosures.
2. Maintain temperature and humidity within ranges required by manufacturer's instructions.

B. Exterior Storage:
1. Store fabricated products above ground, on blocking or skids, prevent soiling or staining.
2. Cover products which are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
3. Store loose granular materials in well-drained area on solid surfaces to prevent mixing with foreign matter.

C. Arrange storage in manner to provide easy access for

inspection.

D. Make periodic inspections of stored Products to assure maintenance under specified conditions, and free from damage or deterioration.

E. Protection After Installation:
   1. Provide substantial coverings as necessary to protect installed Products from damage from traffic and subsequent construction operations.
   2. Remove when no longer needed.

F. Spares:
   1. Collect spares during course of construction and package in protective containers as required.
   2. Contact Owner's Representative for designated storage location.
   3. Before placing in storage, clearly label storage containers with following information:
      a. Name of Project.
      b. Name of Product or Material.
      c. Name of Manufacturer and Model Number.
      d. Location where used.

1.05 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Products List:
   1. Within 30 days after Contract Date, submit to Architect complete list of major products proposed to be used, with name of manufacturer and installing subcontractor.

B. Contractor's Options:
   1. For Products specified only by reference standard, select any product meeting that standard.
   2. For Products specified by naming several products or manufacturer's, select any one of products or manufacturers names, which complies with specifications.
   3. For Products specified by naming one or more Products or manufacturers, Contractor must submit request as for substitutions for any Product or manufacturer not specifically named.
   4. Notification of Unavailable Products:
      a. Notify Architect immediately during bidding process of unavailability of any product or manufacturer where only one product or manufacturer is specified.
      b. Architect will issue addendum for acceptable alternate product or manufacturer for bid process.
      c. Arbitrary substitution is unacceptable.
      d. If Architect is not notified and item is not specifically excluded from bid or included as allowance or per unit cost, pay all costs to provide Architect generated alternate.

C. Substitutions:
   1. Request Consideration:
      a. Construction Period: Requests for substitutions will be accepted during this phase up to 30 days prior to installation.
      b. Substitution requests due to late or out-of-schedule ordering may be subject to rejection by Architect.
   2. Submit separate request for each Product in compliance with methods detailed in Section 01340, Shop Drawings, Product Data, and Samples, supported with complete data, drawings, and samples as appropriate, including:
      a. Comparison of qualities of proposed substitution with that specified.
      b. Changes required in other elements of work because of substitution.
      c. Effect on construction schedule.
      d. Cost data comparing proposed substitution with Product specified.
      e. Any required license fees or royalties.
      f. Availability of maintenance service, and source of replacement materials.
   3. Architect shall be judge of acceptability of proposed substitution.
   4. Do not attempt to include as part of Base Bid, unless specifically identified otherwise, any item to be treated as substitution request where potential rejection by Architect is possible due to unacceptability.

D. Contractor's Representation:
   1. Request for substitution constitutes representation that Contractor:
      a. Has investigated proposed Product and determined that it is equal to or superior in all respects to that specified.
      b. Will provide same warranties or bonds for substitution as for Product specified.
      c. Will coordinate installation of accepted substitution into Work, and make such other changes as may be required to make Work complete in all respects.
      d. Waives all claims for additional costs, under Contractor's responsibility, which may subsequently become apparent.
      e. Agrees to install all material and equipment meeting Specifications at no additional cost to Owner if substitution is rejected by Architect due to unacceptability.

E. Architect:
   1. Architect will review requests for substitutions with reasonable diligence and promptness, and notify Contractor, in writing, of decision to accept or reject requested substitution.
   2. Any rejection of request for substitution is final

and construed as directive to furnish specified product.

3. Architect shall not be subject to frivolous, constant resubmittals of rejected items or new requests for same item.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

- END OF SECTION -

DIVISION 2

SITE and CIVIL WORK

SECTION 02050

DEMOLITION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish all labor and materials necessary to complete all Demolition work as required by drawings and/or specified herein, including demolition and removal of all related items from the project site, as shown on the drawings and as hereinafter specified.

B. Related Work Specified Elsewhere:

1. EARTHWORK - Section 02200.

2. SITE UTILITIES - Section 02550.

PART 2 PRODUCTS

NOT APPLICABLE

PART 3 EXECUTION

3.01 SITE CONDITIONS

A. Visit and accept the site as is. Determine the character and type of structure to be removed. The Owner assumes no responsibility for the condition of the structures. Damage or loss, for whatever reason, shall be at the risk of the Contractor from the date of submission of bids, and no damage or loss to structures shall relieve the Contractor from any obligation under the Contract.

3.02 NOTIFICATION AND DISCONTINUANCE OF UTILITY SERVICES

A. Notify all corporations, companies, individuals or local authorities owning conduits, wire or pipes to, through or across the project site where the structures to be demolished are located. Arrange to have all services, such as water, gas, electricity, and telephone disconnected at the service mains in accordance with the rules and regulations governing the utility involved. Remove all inactive wires, electric service drops and connections and seal all storm and sanitary sewers leading from structures to be demolished with cement mortar at the limit of work line.

B. Maintain in operating condition all active utilities to remain; repair any damage to utilities.

3.03 PROTECTION OF ADJACENT BUILDINGS AND PROPERTY

A. Protect adjacent property and persons occupying such property against any damages or injuries. Do not interfere with the use and safe passage of adjacent buildings and structures.

B. Protect all walks, roads, streets, curbs and pavements, on or off the premises, and repair and replace or otherwise make good any damage.

3.04 SAFEGUARDS

A. Provide, erect and maintain all planking, bridges, bracing, shoring, sheathing, lights, barricades, warning signs, and guards necessary for the protection of streets, sidewalks and adjoining property. Conform to the Massachusetts Department of Public Safety requirements.

B. Investigate and comply with any rule or regulation of the Commonwealth of Massachusetts and the City of Boston, or permits issued by the Commonwealth and the City relative to providing and paying uniformed police officers to regulate or control traffic on existing streets which are interfered with.

C. Do all demolition work under the direction of a licensed building wrecker in accordance with the provisions of Chapter 479, Acts of 1938, as amended, Sections 111 and 120 (d).

3.05 DEMOLITION PROCEDURE

A. Completely remove from the project area all demolition materials taken from the structures and the site and legally dispose of off-site. Allow no accumulation of demolition material which may constitute a hazard.

B. Demolish all structures completely on the premises. Masonry walls, piers or chimneys shall be demolished in small sections. Remove all partitions, columns, furnaces, radiators, tanks, piping, apparatus and debris.

C. Wet down thoroughly all work during demolition to prevent spread of dust.

D. Do no blasting or burning of materials or debris on the project site.

E. Completely remove all protection when the work is completed and when authorized by the Architect.

END OF SECTION

SECTION 02070

SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work Included:
   1. Demolish and remove existing partitions, ceilings, and other items as detailed.
   2. Remove all accumulated debris from all areas of buildings before start of construction operations, whether generated by demolition operations or existing on site at start of demolition operations.
   3. Review restoration and cleaning Sections for specific operations related to concrete, masonry, and wood construction.

B. Related Work:
   1. Section 03700, Concrete Restoration and Cleaning.
   2. Section 04500, Masonry Restoration and Cleaning.
   3. Section 06700, Wood Restoration and Cleaning.

1.02 PROJECT CONDITIONS

A. Existing Conditions:
   1. Lead-Based Substances:
      a. Structure was constructed before 1950 and may contain lead-based substances.
      b. Comply with minimal precautions specified to mitigate possible health and safety hazards for all three classifications of paint surface conditions.

B. Environmental Requirements:
   1. Health and Safety Precautions:
      a. Comply with following precautions to reduce risk of danger arising during paint removal operations.
      b. Lead Dust: Wear toxic dust respirator and wash both skin and clothing after removing paint.
      c. Lead Paint Disposal: Sweep or rake up all dust or paint chips from dropcloth, scrape all sludge into containers, and comply with State Environmental Regulatory Protection programs.
      d. Fire: Maintain fire extinguisher in area of operations at all times.
      e. Chemical P isoning: For solvent-base strippers, wear toxic vapor respirator, cotton lined gloves, full covering on arms and legs; and source of water to flush solvent-base and caustic-base strippers from skin.
      f. Eye Damage: Wear safety goggles when using manual, mechanical, or fluid paint scrapers, sanders, or strippers.

2. Potential Health and Safety Dangers of Paint Removal:
   a. Methods detailed in this Section present health and safety dangers.
   b. Take precautions to reduce dangers during Work.
   c. Following chart details method and potential danger.

Method	Danger				
	Lead Dust	Paint Disposal	Fire	Chemical Poisoning	Eye Damage
Putty Knife	X	X			X
Paint Scraper	X	X			X
Sanding	X	X			X
Electric Heat Plate		X	X		X
Electric Hot Air Gun		X	X		X
Solvent-Base Stripper		X	X	X	X
Caustic Stripper		X		X	X

3. Dust Generating Process: Do not perform processes creating dust or dirt when wind exceeds 10 mph.

PART 2 PRODUCTS

2.01 MATERIALS

A. Comply with specifications and standards for each specific product involved.

B. For areas having minor demolition and renovation, match replacement materials and methods to match existing materials and methods.

C. Comply with applicable requirements of regulatory agency for demolition operations and renovation of surfaces.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect existing conditions of Project, including elements subject to damage or movement during demolition.

B. After uncovering work, inspect conditions affecting installation of Products, or performance of Work.

C. Report unsatisfactory or questionable conditions to Architect in writing; do not proceed with Work until Architect has provided further instructions.

3.02 PREPARATION

A. Provide adequate temporary support as necessary to assure structural integrity of affected portion of Work.

B. Provide devices and methods to protect other portions of Project from damage.

C. Provide protection from elements for that portion of Project which may be exposed by demolition, and maintain free from water.

3.03 PERFORMANCE

A. Execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.

B. Execute fitting and adjustment of Products to provide a finished installaton to comply with specified Products, functions, tolerances, and finishes.

C. Restore Work which has been cut or removed; install new products to provide completed Work in accord with requirements of Contract Documents.

D. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

E. Refinish entire surface as necessary to provide an even finish to match adjacent finishes:
   1. For continuous surfaces, refinish to nearest intersection.
   2. For an assembly, refinish entire unit.

F. Resilient Flooring Removal:
   1. General:
      a. Do not sand or dry scrape existing resilient tile and sheet flooring, backing, or lining felt.
      b. Existing installation may contain asbestos fibers that are not readily identifiable.
      c. Do not allow smoking during removal processes.
   2. Sheet - Adhered:
      a. Cut flooring into 4 in. to 8 in. widths and pull in long narrow strips.
      b. Peel back at angle to permit separation of top layers from felt backing.
      c. Readhere any loose felt.
      d. Level uneven areas with new material manufacturer's underlayment.
   3. Sheet - Unadhered:
      a. Cut flooring into 10 in. to 12 in. widths and pull in long narrow strips.
      b. Roll up each strip with face out.
      c. Tie or tape each roll and place in heavy duty plastic bags.
   4. Tile:

a. Use stiff broad blade scraper with 4 in. blade and 6 in. to 8 in. handle.
b. Strike handle of scraper with hammer while maintaining scraper at 25 to 30 deg. angle to floor for hard to remove materials.
c. Use hot air blower to penetrate and soften adhesive.
d. Take precautions against burning.

5. Residual Felt Backing Removal:
   a. Soak area using solution of liquid detergent at ratio of 1 oz. detergent to 1 gal. water.
   b. Scrape area before solution dries.
   c. Stand on unstripped area of existing floor while scraping felt.
6. Disposal:
   a. Place all scraps in bags or containers.
   b. Label with name of contents and location of removal.
   c. Dispose at approved site.

- END OF SECTION -

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish all labor and materials necessary to complete all Earthwork as required by drawings and/or specified herein, including:

1. Protection.
2. Clearing and grubbing.
3. Stripping of topsoil.
4. Site preparation.
5. Excavation, filling, backfilling and compaction.
6. Sheeting, shoring, and bracing of excavations.
7. Pumping and other means of dewatering to maintain excavated areas free of water from any sourve.
8. Removal of unsuitable or excess materials and debris.
9. Rough grading and subgrade preparation to obtain the sub-grades shown or specified, including the furnishing of additional fill as required.
10. Survey work required to establish and maintain lines and grades.

B. Related Work Specified Elsewhere:

1. SITE IMPROVEMENTS - Section 02440.
2. LANDSCAPING - Section 02480.
3. SITE UTILITIES - Section 02550.

1.02 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

1.03 SUBMITTALS

A. Submit 2 copies directly to the Architect from the testing services, with copy to the Contractor, the report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

B. Testing to be paid for by the Owner.

1.04 JOB CONDITIONS

A. Prior to start of construction, submit a schedule of procedure for control of erosion and sedimentation for Architect's approval. Include proposed materials and construction methods required for the prevention of erosion and sedimentation damage to the Owner's and abutters' properties, water bodies and streams.

B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Architect immediately for directions as to procedure. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

2. Do not interrupt existing utilities except when permitted in writing by local authority or Architect and then only after acceptable temporary utility services have been provided.

3. Demolish and completely remove from site existing underground utilities no longer in use or indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

D. Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots or bark, smothering of trees by stockpiling materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.

PART 2 PRODUCTS

2.01 ORDINARY FILL

A. Natural soil, well-graded and free from all organic, weak, compressible and frozen materials and from all expansive or highly plastic clays; and capable of being easily spread and compacted.

B. Rocks in ordinary fill used for backfill or embankments shall not exceed 2 feet in maximum dimension except that no rock larger than 6" in maximum dimension will be permitted in ordinary fill used in backfilling utility trenches or in the top 2' of fill under pavements or slabs.

C. Ordinary fill placed in areas designated on the drawings to receive planting, loam or sod shall not contain stones larger than 3" in maximum dimension in the top 12" of the fill.

D. Materials from excavations on the site that comply with these specifications may be used for ordinary fill requirements under this Contract. Provide additional off-site material as needed to complete Contract requirements.

2.02 BANK-RUN GRAVEL

A. Bank-Run Gravel Borrow consisting of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings, and deleterious materials.

B. Gradation requirements as determined by AASHTO-T11 and T27 and shall conform to the following:

Sieve	Percentage Passing
1/2 inch	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-8

C. Maximum Largest Dimension of Size of Stone: 3 inches.

2.03 SAND

A. Sand Borrow consisting of clean, inert, hard, durable grains of quartz or other hard durable rock, free from loam or clay, surface coatings and deleterious materials. The allowable amount of material passing a No. 200 sieve as determined by AASHTO-T11 shall not exceed 10% by weight.

B. Maximum Particle Size for Sand Borrow: 1/4 inch.

PART 3 EXECUTION

3.01 SITE PREPARATION

A. General: Remove trees, vegetation, debris or obstructions interfering with installation of new construction. Removal includes existing pavements, footings, foundations, miscellaneous masonry, stumps and roots.

B. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Stockpile topsoil in areas designated by the Architect.

3.02 EXCAVATION

A. Excavation consists of removal and disposal of material encountered when establishing required grade elevations.

B. Classifications of Excavations: The following classifications of excavation will be made only when earth excavation is authorized by Architect and when rock excavation is encountered.

1. Earth excavation consists of removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classifications indicated in data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.

2. Rock excavation consists of removal and disposal of materials encountered that cannot be excavated without continuous and systematic drilling and blasting or continuous use of a ripper or other special equipment, except such materials that are classed as earth excavation.

a. Typical of materials classified as rock are boulders 1-1/2 cubic yard or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.

b. Intermittent drilling performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.

3. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect.

a. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, only when acceptable to the Architect.

b. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Architect.

C. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible either because of space restrictions or stability of material excavated.

1. Maintain sides and slopes of excavations in a safe condition in accordance with the provisions of the Manual of Accident Prevention of the Associated General Contractors of America, until completion of backfilling.

D. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

1. Provide minimum requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

E. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

2. Convey water removed from excavations and rain water to collecting or run-off areas. Provide and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

F. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill; place, grade and shape stockpile for proper drainage.

1. Locate and retain soil materials away from edge of excavations.

2. Dispose of excess soil material and waste materials as specified hereinafter.

G. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction required, and for inspection.

1. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete is placed. Trim bottoms and compact as required by CONCRETE - Section 03300, to required lines and grades to leave solid base to receive concrete.

H. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown.

I. Excavation for Trenches: Cut trenches to cross-sections and grades as shown. Deposit excavated materials to prevent cave-ins or materials faling or sliding into ditch. Keep trenches free of debris until final acceptance of the work.

J. Removal of Unsatisfactory Soil Materials: Excavate unsatisfactory soil materials encountered that extend below required elevations, to additional depth directed by the Architect.

1. Such additional excavation, provided it is not due to fault or neglect of Contractor, will be measured as directed by Architect and paid for as a change in the work.

K. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35^{o} F.

3.03 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification.

B. Percentage of Maximum Density Requirements: Provide not less than following percentages of maximum density of soil material compacted at optimum moisture content, for the actual density of each layer of soil material-in-place.

1. Structures, Building Slabs and Pavements: Compact top 12" of subgrade and each layer of backfill or fill material at 95% maximum density for cohesionless soils, and 90% maximum density for cohesive soil material.

2. Lawn or Unpaved Areas: Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum density for cohesionless soils, and 85% maximum density for cohesive soil material.

C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

a. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a satisfactory value, as determined by moisture-density relation tests conducted by the Owner's testing agency.

3.04 BACKFILL AND FILL

A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classifications listed below:

1. In excavations, use satisfactory excavated or borrow material.

2. Under building slabs and steps, use drainage fill material.

3. Under pavements, use subbase material, or satisfactory excavated or borrow material, or combination of both.

4. Under grassed areas, use satisfactory excavated or borrow material.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance by Architect of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Inspection, testing, approval, and recording locations of underground utilities.

3. Removal of concrete formwork.

4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

5. Removal of trash and debris.

C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

1. When existing ground surface has a density less than that specified under COMPACTION for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

D. Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

1. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.

3.05 GRADING

A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:

1. Grassed Areas: Finish areas to receive topsoil to within not more than 0.10 feet above or below the required subgrade elevation.

2. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 0.10 feet above or below the required subgrade elevation.

C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified and to required elevation. Provide final grades within a tolerance of 1/4 inch when tested with a 10 foot straightedge.

D. Compaction:

1. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.06 PAVEMENT SUBBASE COURSE

A. General: Subbase course consists of placing subbase material, in layers of specified thickness, over ground surface to support a pavement base course.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

1. When a compacted subbase course is shown to be 6" thick or less, place material in a single layer. When shown to be more than 6" thick, place material in equal layers, except no single layer more than 6" or less than 3" in thickness when compacted.

3.07 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion, and keep free of trash and debris.

1. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape and compact to required density prior to further construction.

3.08 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. No burning or blasting on Owner's property.

B. Remove debris and waste materials from Owner's property and legally dispose of off-site.

END OF SECTION

SECTION 02440

SITE IMPROVEMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish all labor and materials necessary to complete all Site Improvements as required by drawings and/or specified herein, including:

1. Gravel base courses for paving.

2. Bituminous concrete paving.

3. Cement concrete paving.

4. Precast concrete paving and wood edging.

5. Precast concrete stepping stones.

6. Wood screen fence.

7. Wood trash enclosures.

8. Brick wall.

9. Railroad tie steps and retaining wall.

B. Related Work Specified Elsewhere:

1. EARTHWORK - Section 02200.

2. CAST-IN-PLACE CONCRETE - Section 03300.

3. MASONRY - Division 4.

4. PAINTING - Section 09900.

1.02 SUBMITTALS

A. Submit shop drawings, catalog cuts or samples for precast concrete pavers, precast concrete stepping stones, wood screen fencing, wood trash enclosures and brick for wall.

PART 2 PRODUCTS

2.01 GRAVEL BORROW

A. Gravel: As specified under EARTHWORK - Section 02200.

B. Bituminous Concrete: Class 1, Type I-1 hot plant mixed, conforming to Mass. D.P.W. Standard Specifications For Highways and Bridges, Class 1, Type I-1, Section 460, as applicable.

2.02 CEMENT CONCRETE PAVING

A. Portland Cement: Conforming to ASTM Specifications C-150, Type 1.

B. Aggregates: Clean and hard; free of loam, silt or clay, conforming to ASTM Specifications C-33. Coarse aggregates shall be size designated as No. 4 to one inch.

C. Concrete: Certified 4,000 pounds per square inch (28-day strength). Maximum allowable water content, 6 gallons per sack. Slump not to exceed 4 inches. Minimum cement factor, 5¼ sacks per yard. Ready-mix concrete, conforming to ASTM Specifications C-94.

D. Water: Potable.

E. Air-Entraining Agent: Conforming to ASTM C-260. Concrete shall contain 4 to 6 percent entrained air.

F. Welded Steel Wire Fabric: 6" x 6" - W1.4 x W1.4 conforming to AASHTO Specifications M35.

G. Premolded Joint Filler: Non-extruding and resilient bituminous type, conforming to ASTM D 1752-67, Type 2, ½ inch in thickness.

H. Sand: Clean, hard, durable grains, free from foreign substances, uniformly graded with coarse particles predominating.

I. Forms: Clean, strong enough to resist pressure of concrete without springing, tight enough to prevent leakage. Steel or wood forms are acceptable.

J. Impervious Liquid Membrane Curing Material: Conforming to AASHTO - M148, Type 1 or 2.

2.03 PRECAST CONCRETE PAVERS

A. Pavers: 9" length x 5½" width x 2-3/8" depth, fabricated of "no-slump" concrete mix comprised of 6 mm/¼" washed limestone, block sand and Portland cement. Made under extreme pressure and high frequency vibrations, a compressive strength of greater than 58MPa/8500 psi; a water absorption maximum of 5% and freeze/thaw resistance equal to Section 8 of ASTM C 67-73 or CSA A82.2-1967.

Pavers to be in two colors, light and dark "earth tone" colors. Final colors to be selected by the Architect from approved samples.

B. Gravel and Sand: As specified under EARTHWORK - Section 02200.

C. Wood Edging for Pavers: 2" x 8" planks and 2" x 4" stakes, Douglas Fir, Grade B or better, pressure-treated in accordance with AWPA, Standard P5. Spikes shall be hot-dipped galvanized.

2.04 PRECAST CONCRETE STEPPING STONES

A. Stepping Stones: 1½' x 2½' x 2", 4,000 psi precast concrete as specified under PRECAST CONCRETE - Section 03400.

B. Finish: Hand-rubbed with carborundum stone, medium rough.

C. Color: "Earth tones". Submit samples for Architect's approval.

2.05 WOOD SCREEN FENCE

A. All Lumber: Select Southern Yellow Pine, kiln dried, impregnated with preservative meeting Standard P5 in accordance with American Wood Preservers Association. Preservatives shall be applied in a closed cylinder by vacuum pressure process, full cell method, in strict accordance with the recommended practices of the AWPA, Standard C2, or the appropriate AWPA Standard covering the commodity treated. Material shall be dried, after treatment, to a maximum moisture content of 19%. Two brush coats of treating solution shall be applied to all field cuts.

B. Cut all lumber to the dimensions shown on the drawings.

C. Lumber shall bear a mark of mill identification and shall bear the grade/trademark of the association under the rules or standards of which they were produced.

D. Stain: Moores, Pratt & Lambert, Sherwin-Williams, or approved equal, exterior grade. Color selected by the Architect.

E. Nails: Aluminum screw type.

2.06 WOOD TRASH ENCLOSURES

A. Lumber, nails and fasteners, and stain as specified herein under WOOD SCREEN FENCE.

2.07 BRICK WALL

A. Brick: As specified under MASONRY - Division 4.

B. Concrete for Footings: As specified under CAST-IN-PLACE CONCRETE - Section 03300.

2.08 RAILROAD TIE STEPS AND RETAINING WALL

A. Railroad Ties: New, sound, straight, 6" x 8" x 8'-0", thoroughly impregnated with wood preservative.

B. Spikes: 10" in length, hot-dipped galvanized.

PART 3 EXECUTION

3.01 GRAVEL BASE COURSES

A. Place and compact as per EARTHWORK - Section 02200, 95% compaction to depths as shown on the drawings.

3.02 BITUMINOUS CONCRETE PAVING

A. Install bituminous concrete as per D.P.W. Standard Specifications For Highways and Bridges requirements, 2 courses: binder course 1½" compacted thickness; surface course 1" compacted thickness.

3.03 CEMENT CONCRETE PAVING

A. Place and compact gravel base course to the thickness as shown on the drawings and as specified under EARTHWORK - Section 02200.

B. Set forms to provide for 4" depth of compacted concrete, firmly staked in place, tops set at exact finish grade. Oil forms with non-staining oil as required.

C. Install expansion joints, cut back 1/4" below finish grade of concrete. Install expansion joints around utility structures, buildings, steps, platforms and other structures in concrete paving.

D. Moisten gravel base course with no standing water.

E. Pour concrete in alternate sections between expansion joints. Spade concrete thoroughly along forms and expansion joints. Tamp and screed to a dense mix.

F. Provide a street broom finish to concrete surfaces. Finishing to be done after surface has been troweled to a smooth even surface and sufficient mortar has been brought to the surface.

G. Remove forms while concrete is still "green".

H. Cure concrete surfaces by covering with burlap, or other suitable material approved by the Architect. Keep moist for 72 hours (minimum) after which covering shall be removed.

I. Apply liquid membrane curing material in strict accordance with Manufacturer's Specifications.

J. Protect by not allowing use for a minimum of 5 days after installation.

K. Pour and finish panel(s) for Architect's approval prior to installation of concrete paving.

L. Place no concrete when 40 degrees F. or below, or when expected to drop to 40 degrees F. within 24 hours after placing concrete. Maintain mix at a minimum of 50 degrees F.

3.04 PRECAST CONCRETE PAVERS AND WOOD EDGING

A. Install 2" x 8" wood edging securely staked and nailed for pavers along lawn and plant bed edging where shown and as detailed on the drawings.

B. Install 6" gravel and compact to a point 3" below proposed finish grade of the paving.

C. Spread thoroughly dried sand and fine grade with no deviations in finish grade exceeding 1/8" when checked with a 10'-0" straightedge. Depth of sand shall be 3/4" to 1" (approximately 1/2" above finish grade to allow for settlement). Do not compact the sand at this stage.

D. Install pavers with joints not to exceed 1/8". Where blocks require fitting against edges or ends, cut to a straight even surface without chipping with a guillotine cutter approved by the Architect.

E. Broom in sand and lightly sprinkle with water to completely fill all joints.

F. Compact surface of paving with a suitable plate vibratory compactor to bring the final surface to a smooth true grade pitched to drain as shown on the drawings. Surface shall be checked with a 10'-0" straightedge with no deviations in excess of 1/8" permitted.

G. Broom additional sand in joints as required to fill all joints. Sweep off excess material.

3.05 PRECAST CONCRETE STEPPING STONES

A. Install stepping stones on 3" compacted sand base course, where shown on the drawings and as directed by the Architect.

3.06 WOOD SCREEN FENCE

A. Fences shall be installed by experienced fence erection crews. Fences shall be straight, true and plumb, with a straight top line, installed to the methods and dimensions as shown on the drawings.

B. All cross members shall fit securely into posts. Slats abutting posts shall be planed to fit snuggly to posts. Slats shall be nailed to cross members, 2 nails each to top, bottom and middle cross member.

C. Paint: Paint 2 field coats exterior stain.

3.07 WOOD TRASH ENCLOSURES

A. Erect as specified herein under WOOD SCREEN FENCE and as detailed on the drawings.

B. Paint: Paint 2 field coats exterior stain.

3.08 BRICK WALL

A. Construct as shown on the drawings and as specified under MASONRY - Division 4.

3.09 RAILROAD TIE STEPS AND RETAINING WALL

A. Construct as shown on the drawings, securely spiked in place.

END OF SECTION

SECTION 02480

LANDSCAPING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish all labor and materials necessary to complete all Landscaping as required by drawings and/or specified herein, including:

1. Preparation of subgrades.

2. Spreading of loam.

3. Finish grading.

4. Sodding of lawn areas.

5. Planting of trees and shrubs.

6. Mulching.

7. Maintenance and guarantee.

B. Related Work Specified Elsewhere:

1. EARTHWORK - Section 02200.

2. SITE IMPROVEMENTS - Section 02440.

PART 2 PRODUCTS

2.01 LOAM

A. Loam: From topsoil stripped and stockpiled, approved by the Architect, and friable loam borrow, typical of local cultivated topsoils containing 2% (min.) decayed organic matter (humus), no toxic materials, from well-drained, arable site, reasonably free of subsoil, stones, earth, clods, sticks, roots and debris.

Deliver or spread no topsoil in frozen or muddy conditions.
Test all loam for acidity, fertility and general texture by a recognized commercial or government agency. Report findings and recommendations to the Architect.

2.02 SOIL CONDITIONERS

A. Bone Meal: Commercial raw bone meal, finely ground, 1% nitrogen and 23% phosphorus acid (min.).

B. Manure: Well rotted, unleached, stable or cattle manure reasonably free of wood shavings, sawdust or other litter and no chemicals or other ingredients harmful to plants. Dehydrated manure, Bovung or equal, acceptable.

C. Fertilizer: Complete 50% (min.) nitrogen derived from natural organic sources or ureaform. Percentages by weights:

N - 5% P - 10% K - 10%

Deliver mixed as specified, standard size, unopened containers, showing weight, analysis and manufacturer. Store in a weather-proof place. If bulk spreading is authorized, provide Architect with notarized written affidavit certifying weight and analysis.

D. Slow Release Fertilizer: Five-year residual as manufactured by Unique Fertilizer, Inc., P.O. Box 99, Deptford, N.J. 08096, or approved equal.

E. Peat: Domestic or imported, or partially decomposed vegetable matter or natural occurence, brown, clean, low in content of mineral and woody material, mildly acid, granulated or shredded, free from weedy grasses, sedges or rushes.

F. Lime: Ground, dolomite limestone, 95% passing 20 mesh screen, and at least 50% will pass a 100 mesh sieve.

G. Planting Mixture: Topsoil thoroughly incorporated with well-rotted manure proportioned 1 c.y. to 7 c.y. topsoil or equivalent dehydrated manure or bone meal as per Manufacturer's directions.

H. Soil Mix: Beneath the rootball, thoroughly mix a 3" layer of spagnum peat moss with the planting mixture.

2.03 GENERAL

A. Mulch for Planting Areas: Aged pine bark consisting of outer bark of pine trees with minimum hardwood bark.

B. Water: Make all provisions for supply, furnish hose, hose connections and accessories as required.

2.04 SOD

A. Merion Bluegrass or equal, two years old (min.) from time of original seeding; vigorous, well-rooted, healthy turf, free from disease, insect pests, weeds, other grasses, stones, and any deleterious matter.

B. Strip with approved equipment and cut as thinly as possible, allowing only sufficient thickness to allow strips to hold together well during handling, transporting and rehandling.

C. Roll or fold sod prior to lifting and handle in manner that will prevent tearing, breaking, drying or any other damage.

2.05 PLANT MATERIALS

A. Furnish and plant all plants as per drawings and specifications in quantities and sizes as shown on the planting plan.

B. All Plants: Nursery grown in accordance with USA Standard for Nursery Stock, latest edition.

C. Plant Dimensions: Conform to USA Standard for Nursery Stock, latest edition and as shown on plant list.

D. Bare Root (B.R.) Plants: Dig with adequate fibrous roots retained. Cover roots with uniformly thick coating of mud. Puddle immediately after digging or pack in moist straw or moss.

E. Balled and Burlapped (B&B) Plants: Dig with firm natural earth balls of sufficient diameter and depth to indicated most of fibrous roots.

F. Container Grown Plants: Grown in container long enough for root system to have developed sufficiently to hold its soil together firm and whole. No plants loose in container.

G. Protect plants not planted immediately upon delivery with soil, wet moss or other acceptable material.

H. Plants are subject to inspection and approval at place of growth or upon delivery for conformity to specifications as to quality, size, and variety.

PART 3 PROCEDURE

3.01 PLANTING OPERATIONS

A. Planting may be done whenever weather and soil conditions are favorable or as otherwise authorized by Architect. Notify Architect prior to beginning planting operations.

B. Excavate tree pits 2" diam. (min.) and shrub pits 12" diam. (min.) greater than ball of earth or spread of roots and sufficiently deep to allow for 6" (min.) thick layer of planting mixture beneath ball or roots.

C. Locate pits prepared and backfilled with planting mixture to grade prior to planting by staking and recording on plans for location when planting proceeds.

D. Set plants in center of pits, plumb and straight, with crown of plant tolerances $\pm$ 1" shrubs, trees 1" low - 2" high after settlement, than the surrounding finished grade.

E. When B&B trees are set, compact topsoil mixture around bases of balls to fill all voids. Remove burlap, or other material, ropes or wire from tops of balls.

F. Spread out roots of B.R. plants. Work planting mixture carefully among them. Cut off broken or frayed roots cleanly.

G. Thoroughly compact planting mixture around roots or balls and water immediately after plant pit is backfilled. Form a shallow basin slightly larger than pit with a ridge of soil to facilitate and contain water. Cultivate soil in shrub beds, rake smooth and neatly outline after planting.

H. Place slow-release fertilizer packets in accordance with the Manufacturer's directions in backfill as follows:

Trees: 3 packets each.
Shrubs: 2 packets each.

I. Stake or guy trees as detailed.

J. Prune each plant in accordance with American Association of Nurserymen Standards to preserve natural character. Paint cuts over 1" diam. with approved tree paint.

K. Cover all tree and shrub pits immediately after planting with 3" (min.) layer of aged bark mulch. Limit of mulch for trees shall be area of pit; for shrubs in beds, entire area of shrub bed.

L. If rock, underground construction work or obstructions are encountered in plant pit excavation, Architect will select alternate locations.

M. See Utility Drawings for locations of underground utilities

3.02 MAINTENANCE - PLANTING

A. Protect and maintain new planting until planting is complete. Water, weed, cultivate, mulch, tighten and repair stakes, remove dead material, reset plants to proper grades or upright position, restore planting saucer, and other necessary operations. Protect lawn areas and repair any damage resulting from planting operations.

3.03 SODDING OPERATIONS

A. Grade and uniformly compact subsoil parallel to and 4" (min.) below proposed finished grade.

B. Loosen and mix subgrade material 2" (min.) deep. Remove stones over 2", sticks and rubbish. Move no heavy objects over lawn areas after preparing subgrade soil.

C. Manually apply lime to subsurface and spread 20 lbs. to 1000 sq. ft.

D. Evenly spread and lightly compact loam 4" deep (min.). Bring to finish grade and smooth. Allow for settlement. Spread no frozen or muddy loam.

E. Manually apply lime - 100 lbs. per 1000 sq. ft.

F. Before sodding, scarify soil, rake and roll until surface is smooth, friable, and of uniformly fine texture.

G. Moisten surface to be sodded before sod is set; carefully handle sod to prevent loosening of loam from roots. Settle sod firmly in place, fill crevices with approved loam, tamp, roll and water surface.

H. Apply 5-10-10 fertilizer at 25 lbs./1000 sq. ft. after installation.

I. Install sod 48 hrs. (max.) after cutting.

3.04 MAINTENANCE - LAWNS

A. Begin maintenance immediately following last operation of installation for each portion of lawn. Protect and maintain by watering, mowing and resodding as necessary to produce a uniform stand of grass. Continue maintenance until a uniform turf is established composed of grasses specified and until acceptance.

3.05 INSPECTION FOR ACCEPTANCE - LAWNS AND PLANTING

A. Inspection of the work of this Section to determine completion of contract work, exclusive of possible replacements of plants, will be made by Architect at conclusion of the maintenance period upon written notice requesting such inspection submitted by Contractor at least 5 days prior to anticipated date. Condition of lawns will be noted and determination made by Architect whether maintenance shall continue in any part.

B. After inspection, Contractor will be notified in writing by Architect of acceptance of all work of this Section, exclusive of possible replacements, for completion of work. Lawn maintenance or other work remaining shall be subject to reinspection before acceptance.

C. Work of this Section will be accepted in part by Architect upon written application by Contractor provided work offered for acceptance comprises all of work of this Section entirely completed, including lawn maintenance, but exclusive of possible replacement of plants, located within a contiguous area which is a substantial portion definitely separated from remainder of the site by roads, walks, fences, other structural barriers, or readily defined topographical features.

3.06 PLANT GUARANTEE AND REPLACEMENT

A. Plants shall be guaranteed for duration of one full year after planting, and shall be alive and in satisfactory growth at the end of guarantee period.

END OF SECTION

3.07 PLANT LIST

KEY	PLANT NAME	SIZE	QUANTITY PER BUILDING #400	#395 #397	#500	TOTAL QUANTITY
PO	Pin Oak	2½-3"	2	---	---	2
HL	Honey Locust - Shademaster	2½-3"	2	---	1	3
BP	Bradford Pear	3-3½"	2	---	---	2
FC	Barbara Ann Flowering Crab	5-6'	---	1	---	1
WP	White Pine	3-4'	5	---	---	5
SY	Spreading Yew	2½-3'	12	6	3	21
HY	Hicks Yew	3-3½'	6	---	---	6
SJ	Seagreen Juniper	2-2½'	---	6	---	6
DWE	Dwarf-Winged Euonymus	18-24"	61	---	10	71
AWS	Anthony Water. Spirea	2-2½'	32	8	---	40
POT	Potentilla	2-2½'	9	8	---	17
HYL	Hybrid Lilac	4-5'	3	---	---	3
HH	Hellers Japanese Holly	18-24"	16	---	---	16

3.07 PLANT LIST (Cont.)

KEY	PLANT NAME	SIZE	QUANTITY PER BUILDING #400	#395 #397	#500	TOTAL QUANTITY
WB	Woodbine	3 Yr.	5	---	---	5
KAz	Korean Azalea	2-2½'	3	2	2	7
PJM	P.J.M. Rhododendron	18-24"	4	2	1	7
CRC	Cranberry Cotoneaster	18-24"	11	---	---	11
PT	Pachysandra	3" Pot	517	144	300	961
FT	Firethorn (Espaliered)	2-3'	---	5	4	9

NOTE: 1.) All plant material balled and burlapped or containerized.

2.) All trees to be staked (3 per tree).

END OF SECTION

SECTION 02550

SITE UTILITIES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish all labor and materials necessary to complete all Site Utilities as required by drawings and/or specified herein, including:

1. Roof drainage system.

2. Sanitary sewer system.

3. Fire and domestic water systems.

4. Gas system.

B. Related Work Specified Elsewhere:

1. EARTHWORK - Section 02200.

1.02 REFERENCES

A. BWSC: City of Boston Water and Sewer Commission.

B. ASTM: American Society of Testing Materials.

C. AWWA: American Waterworks Association.

1.03 SUBMITTALS

A. Submit shop drawings or catalog cuts for all piping, valves and boxes and tapping sleeves for Architect's approval.

1.04 TESTING

A. Perform all tests on sewer and water systems in accordance with and under the supervision of BWSC personnel.

PART 2 PRODUCTS

2.01 ROOF DRAIN AND SANITARY SEWER SYSTEMS

A. Pipe: Extra strength vitrified clay (ASTM C-700) or ductile iron (Class 52) for sanitary connections and extra strength vitrified clay (C-700), extra strength non-reinforced concrete (C-14) or Class IV reinforced concrete (C-76) for storm drain connections.

2.02 WATER SYSTEMS - DOMESTIC AND FIRE

A. Services Up To and Including 2": Copper, Type K.

B. Services 4" and Larger: Ductile iron cement lined (Class 52).

C. Connections of Water Services 4" and Larger: Solid sleeve tapping sleeve and valve, Mueller Type H610, Mueller Type H615, or equal.

D. All Valves 4" and Larger: New York Metropolitan Style as manufactured by M&H Valve or Smith Valve.

2.03 GAS SYSTEM

A. All materials and equipment will be supplied by the Boston Gas Company.

PART 3 EXECUTION

3.01 TRENCH EXCAVATION & BACKFILL

A. Excavation, trenching and backfilling as specified under EARTHWORK - Section 02200 and as follows: Trim the bottom of all excavations and trenches to receive equipment and pipe; provide finish grade by hand methods. The bottom of all trenches shall be carried to 6" below pipe invert in undisturbed soil and 12" below pipe in existing fill, and the entire trench backfilled with coarse sand up to the third point of the pipe, firmly compacted. Bell holes shall be dug to insure pipe resting for the entire length upon the bottom of the trench.

B. Piping shall not be installed on ledge or stone. Ledge and/or stone shall be removed to a minimum depth of 6" below the bottom of the pipe, and the trench shall be backfilled with screened gravel. The gravel shall be brought up to the required grade and compacted to 95% compaction before laying of pipe.

C. In pipe trenches, after the pipes have been tested and approved, trenches shall be backfilled by hand with the excavated materials free from large clods or stones, carefully deposited in layers not to exceed six (6) inches in thickness on both sides of pipe and thoroughly rammed until enough fill has been placed to provide a cover of not less than one (1) foot above the top of pipes. Backfill shall be compacted thoroughly under and around the pipe. Backfill below the pipe center line shall be placed and compacted by hand. Backfill between the center line and one (1) foot above top of the pipe shall be deposited by hand and leveled and compacted to 95% compaction before the additional height of backfill is placed by machine.

D. Connections to structure shall be watertight after installation. All piping shall accurately conform to the lines and grades shown on the drawings. All piping shall be examined for defects. Any defective pieces discovered after installation and test shall be removed and replaced by the Contractor at his own expense. Pipe system shall be inspected and joints shall be approved before backfilling over pipe is permitted.
All pipe and fittings shall be kept clean until final acceptance of work. The exposed ends of all uncompleted lines shall be closed with wooden plugs at all times when pipe laying is not actually in progress. All piping shall be installed on a good foundation and adequate means taken to prevent settlement.

3.02 ROOF DRAIN, SEWER AND WATER SYSTEMS

A. Perform all sewer and water work in connection with street connections and street restorations in accordance with the Standard Specifications of the BWSC.

B. Encase all chimney connections in concrete in accordance with BWSC Standard Details.

C. Laying of water lines shall be in accordance with applicable AWWA Specifications and shall conform in all respects to City requirements. Water lines shall have minimum cover of five (5) feet. Any pipe showing settlement after laying or which is not in true alignment or otherwise unsatisfactory before final acceptance of the work shall be taken up and relaid by the Contractor without additional compensation.

D. Jointing of pipes shall be in strict accordance with manufacturer's specifications.

E. All tees, plugs and bends shall be braced with cast-in-place concrete thrust blocks in conformance with City requirements and shall be so constructed so as to be accessible for inspection and drainage as required.

3.03 GAS SYSTEM

A. Boston Gas Company will install all pipe and appurtenances including trench excavation and backfill up to the meter.

END OF SECTION

DIVISION 3

CONCRETE

SECTION 03340

CONCRETE

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Attention is directed to the printed form of Contract and Sections _ through _ of these specifications which are hereby made a part of this Section of the Specifications.

1.02 SCOPE OF WORK

A. The work under this section includes but is not limited to concrete slabs, foundation walls, footings, formwork and reinforcement.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A.	Earthwork	Section __
B.	Rough Carpentry	Section __
C.	Insulation	Section __

1.04 RESPONSIBILITY OF CONTRACTOR

A. The Contractor shall be fully responsible for the design, strength, safety and adequacy of all formwork, shoring, bracing, and all methods of construction and for the strength, slump, consistency, finish and general quality of the concrete used in the work. The requirements for formwork or construction methods, cement/water ratios, slump, preliminary approvals by the Architect or any other requirements shall be construed as the minimum acceptable and shall not eliminate, lessen or restrict in any manner the responsibility of the Contractor for all construction methods and for providing concrete in the completed structure that fully meets the strength, appearance and all other requirements of the Contract Documents.

B. The Contractor shall present to the Architect a schedule of concrete placement indicating areas to be cast and showing in detail methods he proposed to use at construction joints not indicated on the Drawings.

C. All costs in connection with correcting and/or replacing rejected work, including additional engineering and other out of pocket expenses to the Architect, shall be at the

Contractor's expense.

1.05 STANDARDS

A. Unless otherwise specified herein, all work shall be performed in full compliance with the requirements of the following standards, codes, and recommendations, including latest addenda and supplements.

ACI 301	Specifications for Structural Concrete for Buildings.
ACI 306	Recommended Practice for Cold Weather Concreting.
ACI 318	Building Code Requirements for Reinforced Concrete.
ACI 347	Recommended Practice for Concrete Formwork.
ACI 211.1	Recommended Practice for Selecting Proportions for Normal Weight Concrete.
ACI 614	Recommended Practice for Measuring, Mixing, and Placing Concrete.
ASTM C31	Making and Curing Concrete Compression and Flexural Strength Test Specimens in the Field.
ASTM C94	Specifications for Ready Mixed Concrete.
ASTM C143	Test for Slump of Portland Cement Concrete.
ASTM C172	Sampling Fresh Concrete.
ASTM C231	Test for Air Content of Freshly Mixed Concrete by the Pressure Method.
CRSI	Recommended Practice for Placing Bar Supports.
CRSI	Recommended Practice for Placing Reinforced Bars.
NRMCA	Concrete Plant Standards and Truck Mixer and Agitator Standards.

B. Copies of these codes and standards shall be kept available in shop and field.

C. In case of conflict between specified codes and standards, the more stringent requirement shall govern, In case of conflict between specified codes and standards and these specifications, these Specifications shall govern.

1.06 INSPECTION, TESTING AND QUALITY CONTROL

A. A testing agency will be selected by the Owner to verify the acceptability of material and the design of the basic concrete mixes, to inspect reinforcing and formwork and to correlate field practices with the Specification requirement.

B. Inspection, testing and approval shall in no way relieve the Contractor of his responsibility to provide quality control, materials and workmanship fully ensuring that this work will conform to the Contract requirements.

C. The Contractor shall carry our diligently, and without delay, those corrections as directed by the testing agency when construction operations indicate the Specification requirements or construction practiced are being or about to to be violated.

D. The Architect or his representative will, at all times, have the right to delay or stop concrete operations when in his judgment quality of the construction will impair the strength, durability or appearance of the finished work. All costs arising from delays due to non compliance shall be paid by the Contractor.

E. The Contractor shall coordinate with the testing agency to insure that materials are supplied, samples and tested so as not to delay the progress of the work. Whenever the source, quality or characteristics of the approved materials changes or indicates lack of compliance with Contract requirements, the Contractor shall resubmit additional materials for the testing agency to sample.

F. The Owner shall pay for the cost of the services of the testing agency.

G. The Contractor shall cooperate by allowing clear and safe access to the work for sampling, inspection and storage of specimens and equipment. He shall construct a storage box on the site of sufficient size to store 24 cylinders which will afford the protection required by ASTM C31.

H. When test or control specimens fall below the specified strength, or when freshly cast concrete is suspected of

being frozen or damaged by frost, the Architect may, instead of the removal of the concrete in question, require core specimens taken from it and tested in accordance with ASTM C42. If these specimens do not meet the strength requirements, the Architect will have the right to require additional curing, load tests, strengthening or removal and replacement of those parts of the structure which are unaccetable and in addition removal of such sound portions of the structure as necessary to insure the safety and durability of the structure. All such work shall be at the Contractor's expense.

I. Those portions of the structure that do not meet the Contract requirements based on appearance of for any other aesthetic reason shall be corrected or removed and replaced as directed by the Architect and all cost of corrections, removal, and replacement shall be at the Contractor's expense.

J. The Contractor may proceed with form construction installation of embedded items and reinforcement but shall not place concrete into or around such items until the Architect has approved the work.

K. The Contractor shall notify the Architect and testing agency not less than 24 hours in advance of the starting of any project concrete operations, whenever concrete in excess of 5 cubic yards is batched or placed.

1.07 SHOP DRAWINGS

A. Submit shop drawings to the Architect for approval prior to fabrication in accordance with Section __-Submittals. Shop Drawings shall include but shall not be limited to the following:

1. Bar reinforcement shop drawings shall include setting plans, wall elevations, bending diagrams, cutting lists and other information so as to completely define and establish the location, spacing, size length, bending, shape, splicing and keying at construction joints and all other pertinent information as required. Drawings shall show grades of reinforcing steel. Opposites hand reinforcing shall be detailed separately. Wall reinforcing shall be detailed on wall elevations.

2. Type, size, and locations of all accessories required for proper assembling, placing and supports of the reinforcement.

3. All openings, depressions, construction and control joints, trenches, sleeves, inserts and all other project requirements affecting reinforcing details and placing.

PART 2 MATERIALS

2.01 CONCRETE MIX MATERIALS

A. Cement: ASTM C150 Type I or II

B. Aggregates: ASTM C33. Use 3/4 inch maximum size for all concrete.

C. Water: portable

D. Water reducing and plasticizing admixtures: ASTM C494, Type A (use in all concrete).

E. Air entraining admixture: ASTM C260 (use in all concrete exposed to the weather.)

F. Calcium Chloride or compounds containing it shall not be used.

2.02 FOR MATERIALS

A. Forms for concrete surfaces exposed to view shall be metal forms or sound clean new exterior grade plywood.

B. Forms for concealed concrete surfaces shall be boards, plywood or steel forms.

C. Forms release agent for all concrete to be left exposed, or to receive any applied finish shall be non-staining, non-emulsifiable type. Form coatings shall be compatible with any material to be subsequently applied to the concrete surfaces.

2.03 REINFORCEMENT MATERIALS

A. Bar reinforcement: ASTM A615, Grade 60, except stirrups and ties to be Grade 40, unless otherwise noted on structural drawings.

B. Welded Wire Fabric Reinforcement: ASTM A185.

C. Reinforcement Accessories: Including all spacers, chairs, ties, slab bolster, clips, chair bars and other devices for properly assembling, placing, spacing, supporting and fastening the reinforcement. Wire for the tieing shall

be 18 gauge black annealed wire conforming to ASTM A-82.

D. Fabrication of Reinforcement: Reinforcement shall be accurately formed to dimensions on the approved shop drawings, details, and schedules. Fabrication shall not commence until shop drawings, details, and schedules have been approved by the Architect.

2.04 CONCRETE MIX DESIGN

A. It is the intent of the Specifications to secure, for every part of the work, concrete of homogeneous structure which, when hardened, will have the required strength and appearance.

B. Basic mix proportions shall be established by the Contractor by means of prior laboratory tests made with the constituents to be used in the work.

C. The mix proportions of each type of concrete to be used in the work shall be based on laboratory derived curves showing the relations between water content, cement content, and 7 and 28 day compressive strengths of concrete made using the proposed materials or from prior field test of the same mix.

D. The consistency of the concrete at the time of deposit as measured by ASTM C143, "Standard Method of Test for Slump of Portland Cement-Concrete."

E. At least two weeks before the first scheduled concrete placement, submit to the Architect and the testing agency, proposed design mixes for each type of concrete to be used in the work. Including water/cement/strength curves and all other supporting data. Also, submit to the testing agency all other supporting data. Also, submit to the testing agency all concrete materials and mixtures for acceptance testing of the materials and verification of the proposed concrete mixes at least two weeks before the Contractor proposes to use them in the work.

F. If the basic design mixes have not been properly established and presented to the Architect or if design mix verification tests by the testing agency indicate that the design mixes in any way fail to comply with all specified requirements, the Architect may require that design mixes be revised and resubmitted until the proposed design mixes are satisfactory. No concrete may be placed in the work until the appropriate design mix has been approved by the Architect.

G. If, during, the progress of the work, any difficulty should occur in securing concrete of the required workability and strength with the materials being used, the Architect may order such changes in the proportions of materials, or both, as may be necessary to secure the desired properties, subject to the limiting requirements specified herein. Any changes so ordered shall be made at the Contractor's expense.

2.05 MISCELLANEOUS ITEMS

A. Floor Hardener shall consist of two pounds of commercial magnesium and zinc fluosilicate to one gallon water.

B. Water-reducing agent: "Sonotard WR" by Sonneborn Building Products, "WRDA" by W.R. Grace Co., "Pozzolith 100" By Master Builders Company, or approved equal, conforming to ASTM C-494 Type A. Water-reducing agent shall be by the same manufacturer as the air-entraining agent.

C. Air-Entraining Agent: "Aerolith" by Sonneborn Building Products, "Darex" by W.R. Grace Co., "MB-VR" by Master Builders Company, or approved equal, conforming to ASTM C-260.

D. Joint Filler: Where used with caulking or sealants shall be cork type, non extruding, self expanding filler strips conforming to ASTM D-1752, III and ASSHO M-153, II as manufactured by Celotex Corporation, W.R. Meadows, Inc., W.R. Grace and Company, or equal. Where no sealant or caulking is required, strips may be non-extruding bituminous type in accordance with ASTM D01751.

E. Non-Shrink Grout: shall be "Embeco 153" by Master Builders, "Sonogrout" by Sonneborn Building Products, "Five Star Grout" by U.S. Grout Corporation, or approved equal.

F. Inserts: Hot-dip galvanized; size and type as indicated on the Drawings.

G. Kraft Paper: Waterproof, reinforced meeting ASTM C-171.

H. Waterstops: PVC waterstops, dumbbell shape, type 741 by Greenstreak Plastic Products or approved equal conforming to U.S. Corps of Engineers Specifications CRC-C572-74.

PART 3 EXECUTION

3.01 FORMWORK

A. Forms shall be used for all concrete.

B. Forms shall be so designed by the Contractor to withstand all dead and live loads, including construction live loads, both vertical and lateral, imposed upon them during construction, concreting and curing periods. Shoring and bracing shall be such that forms do not move out of specified tolerances of line and elevations.

C. Forms for exposed concrete shall be built mortartight and joints filled and tapped to prevent loss of concrete matrix. Edges of formed panels in contact with previously cast concrete, shall be flush within 1/16 inch. Forms shall be continually adjusted for line and elevation during concrete placement as required.

D. Forms and form accessories shall be so designed and installed to be of adequate strength and upon removal in no way damage concrete surface.

E. Before form materials are re-used, surface that will be in contact with freshly cast concrete shall be thoroughly cleaned, damaged areas repaired and all projecting nails withdrawn. Re-use of form material for exposed concrete shall be subject to special approval by the Architect who shall have the right to reject any materials for re-use which he feels may not produce the required aesthetic effect.

F. Before reinforcement is placed within or against formwork, surfaces of forms coming in contact with fresh concrete shall be cleaned and then treated with the approved form release agent.

G. The Contractor shall set and maintain concrete formwork to unsure completed work is within the tolerance limits listed in ACI 347.

H. Box out for all sleeves, hangers, slots, chases, recesses, and temporary openings required by the work of other trades. Provide forms to seal up, when and as required. Build bulkheads with keys as required for construction and miscellaneous metal work which are furnished by other trades. Follow the directions and setting information furnished with such items.

3.02 REINFORCEMENT

A. Reinforcement shall be accurately placed and rigidly secured in position in accordance with the requirements of Recommended Practice for Placing Reinforcing Bar (CRSA 59) and Recommended Practice for Placing Bar Supports (CRSI 63) and with further requirements specified herein.

B. Tie reinforcing with annealed No. 18 gauge wire and bend all wire back beyond general plane of reinforcing.

C. Welded Wire Fabric reinforcement in slabs shall be continuous, shall have joists lapped at least 8 inches and shall be supported at proper elevations by accessories. Stagger laps of sheets to avoid continuous lap in either directions, provide support bars to maintain the fabric in its proper position during the placing of the concrete.

D. Before concrete is cast, check all reinforcement after it is placed to insure that reinforcement conforms to Drawing and approved shop drawings and Specifications requirements. Such checking shall be done only by a qualified experienced personnel. In addition, the Architect shall be notified at least 36 hours prior to concrete placement and given the opportunity to inspect the completed reinforcement and formwork before concrete placement.

E. Reinforcement shall be spliced only as shown on the Drawings or approved by the Architect.

F. Provide and place dowels for masonry construction as shown on the drawings.

3.03 CONCRETE MIXES

A. Strength, cement and water requirements:

Design Compressive Strength f'c	Min Lab Str. Testing Age 7 days	28 days	Min Cement Factor Sacks/cu.yd.	Max Net Water* Glas/Sack
3000 psi	2500 psi	3500 psi	5.5	6.5
4000 psi	3500 psi	4600 psi	6.0	5.75

*This is total water in mix at time of placement, including free water of aggregate and liquid admixtures. Concrete exposed to weather shall have a maximum water-cement ratio

of 6.0 gallons per sack.

B. All concrete shall be proportioned in accordance with ACI Standard 211.1 "Recommended Practice in Selecting Proportion for Normal and Heavyweight Concrete" and comply with the requirements of ACI Standard 301 "Specifications for Structural Concrete", Chapter 3, Method 1 or 2.

C. Air entraining and water reducing agents shall be used in all concrete in strict accordance with manufacturer's printed instructions. Total air entrained in freshly mixed concrete shall be 5.0% plus or minus 1.0% of volume of concrete, with required strengths maintained.

D. Slump of concrete:

1. Pavements, slabs-on-grade: 3 inches

2. Footings and walls: 4 inches

E. Premix admixtures in solution form and dispense as recommended in the design water content of the mixtures.

3.04 PLACING CONCRETE

A. Transport mixed concrete to place of final deposit as rapidly as practical by methods which prevent segregation of the ingredients and displacement of reinforcement, and avoid rehandling. One test will be required for each truck load of concrete. Deposit no partially hardened concrete. Concrete shall no be allowed to flow horizontally over a distance exceeding five feet.

B. Remove water and all foreign matter from place of deposit.

C. Concrete shall be deposited continuously and in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness which the sections. If a section cannot be placed continuously between planned construction joints, a field joint and additional reinforcement shall be introduced so as to preserve the structural continuity. The Architect shall be notified immediately in any such case.

D. Concrete shall be place in such a manner as will prevent segregation and accumulation of cured concrete on the forms or reinforcement above the mass of concrete being placed. To achieve this end, suitable hopper, spouts with restricted outlets, tremies, etc., shall be used as required. Vibrate through successive lifts to avoid pour lines.

E. All slabs shall be finished to exact elevations shown on the drawings, the slab thickness being increased where necessary to compensate for all settlements and deflections due to the weight of the wet concrete on gravel fill.

3.05 FINISHED FLATWORK

A. Steel troweled Finish

1. Provide steel troweled finish on all concrete slabs except where otherwise noted.

2. After the concrete has been placed, struck off, consolidated, screeded, and floated, and as soon as the condition of the slab permits, and before it has hardened appreciably, all water, film, and foreign material which may work into the surface shall be removed. Prior to removal of screeds, the surface shall be checked for trueness and level, and filled or cut down where necessary. Rough finishing shall be repeated with straightedge and float.

3. Compact the surface with an approved disc type power compacting machine weighing at least 200 pounds.

4. The surface shall be finished first with power floats, as specified above, then with power trowels, and finally with hand trowels. The first troweling after power floating shall be done by power trowels and shall produce a smooth surface which is relatively free of defects but which may still contain some trowels marks. Additional troweling shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be thoroughly consolidated by the hand troweling operations. The finished surface shall be a true plane conforming to the finished floor elevations shown on the Drawings and accurate to within 1/4 inch in 10 feet as determined by a 20 foot straightedge placed anywhere on the slab in any direction.

B. Floor Hardener Application

1. Apply two coats of floor Hardener to all concrete floor slabs not receiving another finish material as called for in the drawings.

2. Apply hardener over clean dry concrete (minimum of 28 days after concrete placement). Rate of application for each coat shall not exceed 100 square feet per gallon.

3.06 CURING AND PROTECTION

A. Provide continuous curing for 350 degree days after placement of all structural concrete and slabs. Provide auxiliary heat, spray in membrane covers, or leave forms in place as appropriate for the particular job conditions.

B. Submit for approval the methods proposed for curing and protection prior to placing any concrete.

C. Cure all floors with an approved spray on liquid membrane forming compound complying with ASTM C309 applied immediately after finishing operations are completed.

D. In hot weather, all concreting shall be done in accordance with ACI 305, "Recommended Practice for Hot Weather Concreting."

1. When temperature rises above 70 degrees F., all surfaces of concrete shall be protected against rapid drying.

2. Concrete delivered to forms shall have a temperature of not over 90 degrees F.

3. The temperature of the forms shall not be over 90 degrees F.

E. In cold weather, all concreting shall be done in accordance with ACI 306, "Recommended Practice for Cold Weather Concreting."

1. When the average daily temperature falls below 40 degrees F. all surfaces of concrete shall be maintained at a temperature of at least 50 degrees F., and not over 90 degrees F. for seven (7) days.

2. Concrete delivered to the forms shall have a temperature of at least 60 degrees F. and not over 90 degrees F.

3. The temperature of the forms shall be at least 40 degrees F.

4. The Contractor shall maintain a record of temperature of the concrete at the most exposed surfaces of each placement at the beginning and at the end of each day of the curing period, which record shall be available

to the Architect.

3.07 REMOVAL OF FORMS

A. Remove forms only after concrete has attained sufficient strength to support its own weight, construction live loads thereon, and lateral loads, all without excessive deflection or damage to the structure. Specified below are the minimum requirements for removal of forms. Where strength gain may have been retarded or when necessary to protect surfaces from construction operations, etc., or where more restrictive requirements are shown on the drawings, leave forms in place longer.

B. Leave forms and supports in place for not less than the following periods of time:

1. Vertical surfaces - Concrete must reach 100 day degrees* and must attain a strength a not less than 30% of the specified strength.

*Definition of Day-Degrees: Total number of days times mean daily air temperature at surface of concrete. For example, 5 days at a temperature of 60 degrees F. equals 300 day-degrees. Days or fractions of days in which temperature is below 50 degrees F. shall not be included in the calculations of day-degrees.

2. Horizontal surfaces - Except as noted below, concrete must reach 300 day degrees and must attain a strength of not less than 60% of specified strength.

3.08 CUTTING OF HOLES

A. Cut holes required by other trades in any cast-in-place concrete which did not receive sleeves. Use a core drilling process or sawing process which produces clean sharp edges and the minimum hole size which accommodates the piping, conduit, or equipment requiring the opening.

B. Obtain approval of Architect before cutting any holes for the trades.

3.09 NON-SHRINK GROUT

A. Grout solid all leveling and bearing plates in accordance with manufacturer's recommendations.

3.10 EMBEDDED ITEMS

A. Coordinate the installation of all inserts required by other trades. Such inserts normally are to be in place prior to the placing of reinforcing steel.

B. Place all required anchor bolts, edge angles, etc.

C. Locate waterstops in construction joints where indicated on the drawings. Wire legs of waterstop to reinforcing steel to keep legs vertical during pouring operations.

3.11 JOINTS IN CONCRETE

A. Provide construction joints as shown on the drawings. Construction joints shall be formed with keyed bulkheads. Reinforcing shall continue through the joint.

END OF SECTION 03340

SECTION 03345

CONCRETE FINISHING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Curing Materials.
   2. Hardeners

1.02 QUALITY ASSURANCE

A. Qualifications: Provide personnel experienced in all types of concrete finish work specified.

B. Reference Standards:
   1. ACI 308-81, Standard Practice for Curing Concrete.
   2. ACI 301-72(81), Recommended Practice for Structural Concrete for Buildings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Curing Materials:
   1. Impervious Sheeting:
      a. ASTM C171-69(80) type optional, white opaque.
      b. Do not use in areas of high winds.
      c. For floor slabs subjected to abrasion use non-staining reinforced paper faced with polyethylene film.
   2. Membrane Forming Compound: ASTM C309-81 Type 1, clear or translucent without dye.

B. Hardener:
   1. Use for floors of electrical rooms.
   2. Colorless aqueous solution containing min. 20 lb. per gal. of zinc and/or magnesium flurosilicate or sodium silicate solution with specific gravity of 16.7 deg. Baume.
   3. Acceptable Manufacturer: A.C. Horn Inc. Model Hornolith, Master Builders Co. Model Saniseal, Sonneborn Model Lapidolith, Euclid Chemical Co. Model Surfhard.

PART 3 EXECUTION

3.01 APPLICATION

A. Formed Surfaces:
   1. Finish all surfaces to receive paint finish.
   2. Insure all surfaces are uniform for intended texture, free of imperfect joints, fins, honeycombing air pockets, or bug holes.

3. Remove rough spots, stains, and hardened mortar or grout from smooth surfaces using fine carborondum stone.
4. Non-Uniform Surface Texture:
   a. Prepare mix of one part portland cement, 1-1/2 parts fine sand, and water to produce grout having thick paint consistency.
   b. Wet surface and apply grout uniformly with brush.
   c. Float surface and scour vigorously and allow grout to set for min. 1 hr.
   d. Scrape surface after grout has hardened using edge of steel trowel without removing grout from imperfections.
   ^. Rub with burlap to remove surplus.

B. Floor Slabs:
1. General:
   a. Finished Floor Slabs: True plane surfaces with deviation max. 1/8 in. in 10 ft.
   b. Pitch surface to drain as indicated.
2. Monolithic Finish:
   a. Screed and float with straightedge to bring surface to required finish level with no coarse aggregate visible.
   b. Wood float to true even plane while concrete is still green but sufficiently cured to bear weight of worker without imprint.
   c. Steel trowel to smooth, even, dense finish free from blemishes including trowel marks after dissapearance of surface moisture.
   d. Usage: Resilient flooring, thin-set ceramic tile, carpeting, and where no other finish is specified.
3. Broom Finish:
   a. Screed and float to required finish level with no coarse aggregate visible.
   b. Steel trowel to even, smooth finish while concrete is still green.
   c. Broom with fiber bristle brush in direction transverse to that of main traffic.
   d. Usage: Driveways or ramps.
4. Nonslip Finish:
   a. Screed and float to required finish level with no coarse aggregate visible.
   b. Uniformly sprinkle abbrasive aggregate over floated surface at recommended rate.
   c. Steel trowel surface to smooth, even finish, uniform in texture and appearance.
   d. Usage: Stair treads, walks, and as indicated.

C. Surfaces Other Than Floor Slabs:
1. General:
   a. Repair surface defects within 12 hrs. after form removal.
   b. Remove fins and loose materials.
   c. Cutout to solid concrete where honeycomb,

aggregate pockets, voids over 1/2 in. dia., or holes left by rods or bolts occur.

d. Ream, wet, and brush coat with neat non-shrink cement grout and fill with mortar at all cutout concrete locations.

e. Match mortar color to adjoining surfaces and finish flush.

f. Damp cure patching work min. 7 days.

2. Smooth Finish:

a. Smooth finish by brush coating surfaces with cement grout composed by volume of one part portland cement and max. two parts fine aggregate passing No. 30 mesh sieve, mixed with water to consistancy of thick paint.

b. Scrape off excess grout with trowel and rub surface with burlap to remove any visible grout film.

c. Keep grout damp by means of fog spray during setting period.

d. Use this method unless indicated otherwise.

D. Curing:

1. Protect concrete against moisture loss, rapid temperature changes, mechanical injury, and injury from rain or flowing water for period of seven days.

2. Conform to ACI 308 and ACI 305.

3. During specified curing period, maintain in moist condition at temperature above 65 deg. F.

- END OF SECTION -

SECTION 03700

CONCRETE RESTORATION AND CLEANING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Clean all exposed concrete surfaces.
   2. Resurface floor slabs and stairs at entry with concrete topping.
   3. Rehabilitate and reconstruct damaged and weakened concrete.

B. Related Work:
   1. Section 03345, Concrete Finishing.

1.02 QUALITY ASSURANCE

A. Qualifications - Applicator:
   1. Provide one person to supervise Work of this Section thoroughly familiar with manufacturer's recommended methods, materials, and nature of Work specified.
   2. No Contractor will be considered who has not demonstrated through previous experience ability to perform Work required of this Section.

B. Job Mock-Up:
   1. Cleaning:
      a. Clean 10 ft. sq. wall panel in presence of Architect to desired degree of cleanliness as approved by Architect.
      b. Repeat cleaning if first method is unacceptable using different cleaning methods acceptable to Architect on up to three different panels until method and cleanliness is acceptable.
   2. Test panels and methods will become standard for Work of this Section.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Product Data: Complete list of chemicals and equipment scheduled for use cross-referenced to surface where used.
   2. Shop Drawings: Provide details and information on needling, underpinning, shoring, and bracing.

1.04 PROJECT CONDITIONS

A. Environmental Requirements: Refer to Section 02070, Selective Demolition, for precautions regarding potential lead-based substances during cleaning opera-

tions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cleaners:
1. Light Duty Liquid Cleanser:
a. Composition: Concentrated water-clear liquid cleaning solution containing blend of mild acids, wetting systems, and inhibitors.
b. Do not use muriatic acid.
c. Coverage: 300 sq. ft. per gal. of concentrate.
d. Mix: One part cleaner to 2 to 6 parts water as detailed by manufacturer's instructions for surface involved.
e. Acceptable Manufacturer: ProSoCo., Inc. Model Sure Klean.

B. Repair Mortar:
1. Polymer-powdered, cementitious two-component fast-setting mortar for structural and non-structural repair of existing spalled and damaged concrete.
2. Color: Concrete gray.
3. Compressive Strength: Min. 3000 psi @ 28 days.
4. Acceptable Manufacturer: Sika Corp. Model 121/122.

C. Cement Underlayment:
1. Primer:
a. Solvent free, acrylic dispersion to seal floor and prevent air rising from subfloor and forming bubbles in underlayment.
b. Coverage: 600 sq. ft.
c. Mix: One part primer to 1 part water.
d. Acceptable Manufacturer: Ardex, Inc. Model P-51 Primer.
2. Underlayment:
a. Self-leveling, water-resistant, gray powder mix of cement and synthetic binders.
b. Coverage: 60 sq. ft. at 1/8 in. thickness per 55 lb. bag.
c. Mix: 3.5 parts powder to 1 part water.
d. Compressive Stregth: ASTM C349-82 modified, 4100 psi at 28 days.
e. Hardness: ASTM E10-78, Brinell, 10,400 psi at 28 days.
f. Final Set: Walkable at 2 hrs. at 70 deg. F.
g. Acceptable Manufacturer: Ardex, Inc. Model K-15.

2.02 EQUIPMENT

A. Fluid Blasting Pump Unit:
1. Pressure Rating: Adjustable, 500 to 2000 psi.
2. Flow Rate: Max. 5 gal. per minute.
3. Spray Tip or Nozzle: Min. 20 deg. fan.

PART 3 EXECUTION

3.01 PREPARATION

A. Protection:
   1. General:
      a. Remove and store fixtures, fittings, finish hardware, and accessories in areas affected by restoration and cleaning processes.
      b. Close off, mask, seal, and board-up designated areas, materials, and surfaces to protect from damage.
      c. Secure chemicals in secure location when not in use and in protected location when in use.
   2. Non-Concrete Surfaces: Thoroughly test surfaces where damage could result due to cleaning materials, and provide protection as required.

B. Rebuilding:
   1. Cut out damaged and deteriorated materials with care to prevent damage to adjacent remaining materials.
   2. Needle, shore, and underpin structure as necessary in advance of cutting out materials.
   3. Cut away loose or unsound materials to provide firm and solid bearing for new work.
   4. Build-in cut away areas to match and align with existing areas insuring joints and coursing are true and level, and faces are plumb and in-line.
   5. Ensure anchors, ties, reinforcing are correctly located and built-in.
   6. Build-in all openings, accessories, and fittings.
   7. Repair Mortar:
      a. Apply repair mortar using compound required for each location, mixed and applied to manufacturer's instructions.
      b. Trowel or rub apply thin-coat mortar for skim coats, bugholes, and honeycombs to max. 1/4 in. thickness.
      c. Trowel apply repair mortar to damaged or spalled concrete areas having min. 1/4 in. depth at locations to include, but not limited to, stairs, foundations, and foundation walls; cover repaired exposed surfaces with thin-coat mortar.

3.02 APPLICATION

A. Cleaning:
   1. Water Washing:
      a. Loosen by strong direct stream of water from nozzle of garden hose.
      b. Scrub stubborn dirt and soot using 2 tablespoons trisodium phosphate in 1 gal. water using bristle brush.
      c. Do not use detergent containing soluble salts.
      d. Use prolonged water washing for removal of gyp-

sum crusts or grime chemically bonded to surface.

2. Chemical Cleaning:
   a. Thoroughly wet surface to be cleaned.
   b. Use densely packed soft fibered masonry washing brush or max. 50 psi low pressure spray to apply diluted cleaning solution.
   c. Let solution set on wall for 1 to 3 minutes depending on drying conditions.
   d. Do not allow cleaning solution to dry into surface.
   e. Reapply solution and rinse thoroughly with fresh water maintaining lower surfaces wet at all times to avoid streaking.

B. Cement Underlayment:
   1. Preparation:
      a. Use sharp scraper to remove thick layers and build-ups of adhesive.
      b. Remove powdery, brittle, or other weak adhesive layers.
      c. Do not use solvents.
      d. Broom and vacuum clean cut-back surface.
   2. Installation:
      a. Prime subfloor at rate of 1 gal. of solution to 1/2 gal. water.
      b. Allow primer to dry 24 hrs.
      c. Mix. 1/2 gal. of emulsion with 5 to 6 qts. water.
      d. Add bag of underlayment powder while stirring with electric paddle for 1 to 2 minutes.
      e. Install at min. 1/8 in. thickness.

C. Finishes: Refer to respective Sections of Specifications for finish materials as scheduled.

3.03 CLEANING

A. Remove all debris and dispose in approved manner.

B. Remove all spots, oils, or stains on adjacent surfaces and areas.

C. Leave entire job clean.

- END OF SECTION -

SECTION 03850

CONCRETE CAISSONS

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work covered by this Section of the Specifications consists of furnishing all plant, labor, equipment, appliances and materials and performing all operations in connection with the installation of foundation piers with bell-shaped bases (caissons), complete, in strict accordance with this Section of the Specifications and the applicable drawings.

B. Caissons shall be located and staked out by the Contractor and the Contractor shall maintain all location stakes and shall establish all elevations required.

C. Caissons shall be installed by a Contractor specializing in the type of caissons work hereinafter specified who shall have had considerable experience on similar installations under like soil conditions and ground water, and shall be satisfactory to the Architect.

D. Related work described elsewhere:

1. Earthwork Section __.

2. Anchor and other items furnished under other Section for installation under this Section.

3. Concrete Section __.

1.02 SUBSURFACE SOIL CONDITIONS

A. Logs of borings made at the site are shown with these Specifications.

B. The Architect does not guarantee the accuracy of boring informations which is made available to the Contractor for his information to be used at his own risk. No claim for extra compensation or extension of time will be considered on account of any variation in soil or water conditions between those indicated by the borings and those actually encountered.

1.03 SIZE, DEPTH and LOCATION OF CAISSONS

A. Caissons shafts shall have a minimum diameter of 36 inches. Bell-shaped bases shall have a minimum edge-thickness equal to four inches at the minimum diameter shown on the Contract Plans. The bell roof shall slope not less than sixty degrees with the horizontal.

B. Caisson bells shall be founded on fine grey silty sand.

C. Caissons shall be accurately located. Any caisson which has the center of the top more than D/10 from the locations shown on the Drawings, or which has more than H/60 or D-1/ horizontal offset from the center of the bottom, where D is the least diameter of the caisson bell and H the height, shall have this condition corrected by means of reinforcing in the concrete, or otherwise, to the satisfaction of the Architect at no additional cost to the Owner.

1.04 CAISSON EXCAVATION

A. The Contractor shall do all excavation of caisson shafts and bells, and all sheathing, shoring, bracing, pumping, bailing, and other incidental work necessary to make and maintain the caisson excavations and to keep them free from the water at all times during the placing of the concrete.

B. Caissons may be machine drilled or excavated by manual labor.

C. As soon as the bearing stratum is first reached, regardless of depth, the Contractor shall notify the Architect. The bottom of caissons shall be entirely within the bearing strata.

D. If the caisson cannot be belled to the required diameter, the Contractor shall install a shaft having a diameter equal to that of the bell at no additional cost to the Owner.

E. If, while excavation for the caissons, the Contractor encounters an obstruction, he shall notify the Architect immediately. Obstructions will be defined as boulders, granite blocks, brickbats, and concrete when larger than 3 cubic feet and timbers, logs, and piles larger than 8 inches in diameter. The Architect will require the Contractor to probe to locate the extent of the obstruction. After such probing, the Architect will

determine whether the obstruction shall be removed or whether additional caissons shall be drilled. The Contractor will be reimbursed for additional work of removing obstructions and back filling and/or installing additional caissons. No extras will be allowed, however, obstructions which do not meet the definition given in this paragraph. Accurate records of normal obstruction time and the associated manpower and equipment shall be kept by the Architect, and the Contractor shall be reimbursed on the basis of these records, based on time and materials.

F. If any caisson has been bottomed and remains to be belled and concreted sufficient protection the bell excavation must be provided at the end of the day. The work on that caisson shall be continued until such bell excavation and concreting has been completed.

1.05 CONCRETING

A. All concrete shall be 3000 psi ultimate strength at 28 days.

B. When the excavation of any caisson is complete, any inflow of water from the sides or bottom of the excavation shall be controlled by pumping so as to permit the placing of the concrete without separation of its substituent materials. Concrete may be dropped through free air a maximum of 3'-0".

C. Caissons shall be poured monolithically.

D. All concrete for the caissons shall be carefully placed so as to form substantially a monolithic composed of a cylindrical shaft resting on a ball-shaped base. The concrete in each caisson shall be stopped within a 1" of its cut-off elevation as shown on the Drawings carefully leveled and smoothed off.

E. Steel cylinders, if used for lining the caisson shaft, may be withdrawn as the concrete is deposited, in which case the tip of the concrete in the opening shall be kept a sufficient distance above the bottom end of the lowest steel cylinder being withdrawn to prevent earth from coming in from the sides and mixing with the fresh concrete.

1.06 DOWELS

A. Dowels shall be deformed bars as specified in Section

3A, Concrete, and shall be installed, in the position called for on the drawings. After each caisson is concreted to its cut-off elevation and before the concrete attains its initial set, dowles must be placed accurately with respect to column centerlines. The cost of any additional concrete work necessitated by the improper placement of dowels or improper positioning of caissons will be borned by this Contractor. There always be a minimum of 4# 8 x 4' long, 2' in the caisson, 2' in the grade beams (or piers).

1.07 INSPECTION AND APPROVAL

A. Inspection and approval of the caissons at any stage will be made promptly by the Architect or his representatives so as not to delay the consecutive pursuit of the work. No concrete shall be poured in any caisson until the bearing soil has been approved by the Architect. After the bearing soil has been approved, the caisson shall be kept free of water until placing of concrete is completed.

B. The Contractor must make proper evaluation of the length of caissons from the bottom of structural slab or grade beam to the elevation of the bearing material on which the bell is formed. A copy of the boring log is given with those specifications.

END OF SECTION 03850

SECTION 03860

PRECAST CONCRETE

PART I GENERAL

1.01 RELATED DOCUMENTS

A. The drawings, General and Supplementary Conditions of the Contract and Division 1 General Requirements apply to the work of this Section.

1.02 DESCRIPTION OF WORK

A. The extent of precast prestressed hollow slab units is shown on the drawings.

B. Precast concrete parapet caps.

C. Precast Wheel Stops

1. 500 psi air-entrained standard weight concrete, steam-cured; total air content between 4% and 6%.

2. Comply with PCI MNL-117 and anchor to substrate with 3/4" grouted steel rods.

D. Alternates

1. Refer to Section __ Alternates which may affect the work of this Section. State in the Bid Form the amount to be added to or deducted from the base price for the work of this Section if each alternate is accepted.

1.03 RELATED WORK IN OTHER SECTIONS

A. The Contractor shall coordinate schedules for shop drawings, fabrications, delivery, erection and finish work. The Contractor shall reject all items and workmanship not conforming to generally accepted standards of the precast industry, job specifications and drawings.

B. It will be the responsibility of the Contractor to coordinate and approve the delivery and erection schedule of the precast.

C. The Contractor shall provide true level bearing surfaces at required grades in the cast-in-place concrete which

shall be approved by the precaster prior to the start of erections.

D. The Contractor shall install all dowels, inserts, anchors, and other items which are to be placed within the cast-in-place concrete for the permanent fastening of the precast units to the cast-in-place concrete. The location of such items shall be approved by the precaster prior to the start of erection.

E. The Contractor shall place all cast-in-place concrete and reinforcing steel between precast units exclusive of grout and drypack and reinforcing steel herein.

F. The Contractor shall provide and maintain access to and into the site and around the perimeter of the buildings so that trucks and cranes have ample unobstructed room, free from utility lines and the like, and sound level surfaces from erection and storage (if necessary) of materials supplied under this section of the Specifications. The General Contractor is responsible for maintenance of aforementioned surfaces to include snow and ice removal. The precaster is responsible for maintenance, to include snow and ice removal, of areas in the building which the precaster is working on.

G. Sealing joints between precast components shall be performed and specified in Joint Sealants Section.

H. The Contractor shall provide the precaster with preassembled and sealed conduct and box assemblies, for the precast concrete units, in a manner to facilitate the production process of the precaster. The Contractor shall also provide a licensed electrician to supervise the placement of the electrical assemblies in the casting beds during the manufacturing process.

1.04 QUALITY ASSURANCE

A. Standards and Codes: Design units in accordance with requirements of ACI 318, and as herein specified:

1. Comply with local building code requirements where more stringent then ACI 318.

B. Fabricator Qualifications: Fabricated by a firm regularly engaged in the manufacturer of precast prestressed hollow slab units.

1. Manufacturer's providing precast prestressed hollow slab units include the following:

a. Spancrete
b. Flexicore
c. Approved equal by Architect

2. Pre-Cast Concrete parapet caps are to be supplied by the same supplier as the ground face CMU. Color of precast to match color of ground face CMU.

a. Supplier: Foster Masonry Products.
b. Grout color to Architect's Selection

C. Fire-resistance Rated Precast Units

1. Where precast concrete units are shown on drawings or schedules as requiring a fire-resistance classification, provide certification that units UL meets classification.

1.05 SUBMITTALS

A. Manufacturer's Data

1. Submit 2 copies of manufacturer's specifications and instructions for all manufactured materials and products to the Architect prior to fabrication. Include manufacturer's certifications and laboratory test reports as required.

2. Include erection products for precast units, sequence of erection, and required handling equipment. Indicate that copy of each instructions has been transmitted to the Erector.

B. Shop Drawings

1. Submit shop drawings showing complete information for the fabrication and installation of precast concrete units. Indicate member dimensions and cross-sections; location, size and type of reinforcement, including special reinforcement and lifting devices necessary for handling and erection.

2. Provide layout, dimensions, and identification of each precast unit corresponding to the sequence and procedure of installations. Indicate welded connections by AWS standard symbols. Detail inserts, connections, and joints, including accessories and construction at openings in precast units.

3. Include manufacturer's standard and special loading

chart data for span and load conditions required. Include manufacturer`s setting plans and anchorage details.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver precast concrete units to the project sire in such quantities and at such times as will assure the continuity of the installations. Store units at the project site to ensure against cracking, distortion, staining, or other physical damage, and so that markings are visible. Lift and support units at the designated life points only.

1.07 JOB CONDITIONS

A. Erector must examine all parts of the supporting structure and the conditions under which the precast concrete work is to be erected, and notify the Contractor in writing of conditions detrimental to the installation until unsatisfactory conditions have been corrected in a manner acceptable to the Erector.

PART 2 PRODUCTS

2.01 PRESTRESSING TENDONS

A. Uncoated, 7-wire stress-relieved strand complying with ASTM A 416. Use Grade 250 unless Grade 270 required.

2.02 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II

B. Aggregates: ASTM C 33.

C. Water: Clean, fresh, drinkable

D. Water-Reducing Admixtures: ASTM C494, Type A.

2.03 CONNECTION MATERIALS

A. Steel Shapes: ASTM A 36.

B. Finish or Steel Units: Exposed units galvanized per ASTM A 153; other painted with rust-inhibitive primer.

C. Bearing Pads: Expanded plastic "Koro-lath"; or Plastic non-staining material.

2.04 GROUT MATERIALS

A. Cement Grout: Portland Cement, ASTM C 150, Type I, and clean natural sand, ASTM C 440.

2.05 PROPORTIONING AND DESIGN OF MIXES

A. Design mixes may be prepared by an independent testing facility or by qualified precast manufacturing plant personnel, at precast manufacturer's option.

B. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the project, complying with ACI 211.1

1. Produce standard-weight concrete consisting of the specified portland cement, aggregates, admixtures and water to produce the following properties:

a. Compressive strength; 4000 psi minimum at 28 days.
b. Maximum aggregate size; 3/4"
c. Minimum cement content; 658 lbs. per cubic yard of concrete.
d. Slump at point of discharge; 3" maximum.
e. Total air content; not less than 4% nor more than 6%.

2. Cure compression test cylinders using the same methods as will be used for the precast concrete work.

3. Adjustment to Concrete Mixes: Mix design adjustment may be requested when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Laboratory test data for revised mix designs and strength results must be submitted to and accepted by the Architect before using in the work.

4. Use water reducing admixtures in strict compliance with the manufacturer's directions.

2.06 DESIGN AND FABRICATION

A. Type: Machine made, precast prestressed concrete units with open voids running the full length of slabs, produces under a rigid factory-inspected process acceptable to the Architect.

B. Furnish units which are free of voids or honeycomb, with straight true edges and surfaces.

1. Provide "Standard Finish".

2. Provide longitudinal edges with 2" diameter, 3/8" deep indentation, 24" o.c. for shear transfer.

C. Fabrications: Manufacture units of concrete materials which will provide a minimum 3500 psi compressive strength at time of initial prestress and a 28 day strength of 4000 psi.

D. Adequately reinforce slab units to resist all transporting and handling stresses.

E. Provide headers of cast-in-place concrete or structural steel shapes for openings larger than one slab width in accordance with hollow slab unit manufacturer's recommendations.

F. Dimensional Tolerances: Fabricate hollow slab units (hollow core slabs) to comply with the following fabricated dimensional tolerances:

1. Length, plus or minus 1/2"
2. Width, plus or minus 1/4"
3. Depth, plus or minus 1/4"
4. Positions of voids (vertical or horizontal); plus or minus 1/4"
5. Position of tendons; plus or minus 1/8".
6. Position of handling devices; plus or minus 6"
7. Position of welds plates, plus or minus 1"
8. Camber deviation from design camber, plus or minus 1/8" per ft. but not greater than plus or minus 1/2".
9. Differential camber between adjacent members of the same design; 1/4" per 10 ft. but not greater than 1/2".
10. Squareness of ends (vertical and horizontal alignment); plus or minus 1/4".

G. Ends performed or saw-cut.

PART 3 EXECUTION

3.01 INSTALLATION

A. Lift, place and secure hollow slab units in accordance with manufacturer's printed instructions and final shop drawings, keeping units tight and perpendicular to bearing supports. Do not install hollow slab units until supporting members are in place and secured.

B. Follow erection procedures and sequence of erection as recommended by hollow slab until manufacturer and as acceptable to the Architect.

C. Install units to comply with the installation tolerances indicated.

D. Level slabs accurately as indicated.

1. Use expanded plastic bearing pads and set slabs on solid, level bearings, with bearing surface of slab units not less than 2" at steel supports and not less than 3" at other supports.

2. Align and level by methods, procedures, and equipment as recommended by the hollow slab unit manufacturer.

E. Do not cut holes or install sleeves larger than size permitted by hollow slab unit manufacturer for pipe, conduits, duct, or other penetrations after fabrications.

F. Do not cut reinforcing or prestressed strands without approval of manufacturer and as acceptable to the Architect.

G. Filed cut holes for openings that do not disturb prestressing strands in accordance with hollow slab unit manufacturer's instructions.

H. Grout joints and repair damaged exposed surfaces. Leave units acceptable condition to receive subsequent work.

END OF SECTION 03860

DIVISION 4

MASONRY

SECTION 04100

MORTAR

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Mortar Materials.
   2. Mixes.
   3. Mortar Use Schedule.

B. Related Work:
   1. Section 04200, Unit Masonry.
   2. Section 04500, Masonry Restoration and Cleaning.

1.02 QUALITY ASSURANCE

A. Reference Standards:
   1. ASTM C780-80, Preconstruction and Construction Evaluation of Mortar for Plain and Reinforced Unit Masonry.
   2. BIA, Building Code Requirements for Engineered Brick Masonry.
   3. IMIAC, Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Product Data: Include design mix, environmental restrictions, admixture limitations.

1.04 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Maintain materials and surroundings air temperature to min. 50 deg. F. before, during, and for 48 hrs. after completion of masonry work.
   2. Comply with IMIAC cold weather requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mortar Materials:
   1. Portland Cement: ASTM C150-83a, Normal Type 1, white.
   2. Masonry Cement: ASTM C91-83, general or high strength as required.
   3. Aggregate: ASTM C144-81, standard masonry type, clean, dry, protected from freezing and dampness.
   4. Hydrated Lime: ASTM C207-79, Type S.
   5. Quicklime: ASTM C4-79, non-hydraulic type.

6. Premix Mortar: ASTM C387-83, white.
7. Water: Clean and potable, free of chlorides, oil, acid, alkali, salts.
8. Mortar Coloring Admixture:
   a. Type: Mineral oxide pigment.
   b. Color: Match color of existing adjacent mortar or color as selected by Architect.
   c. Acceptable Manufacturer: Lehigh Portland Cement Co., Solomon Grind Chem Service, Riverton Corp.
9. Admixtures:
   a. Do not use without written approvals.
   b. Submit request for admixtures indicating type, amount by volume, and purpose during bidding or negotiating period.
   c. Do not use accelerators where metal ties, anchors, reinforcement, or other embedded metal items are used in masonry construction.

2.02 MIXES

A. Mortar:
1. Load Bearing Walls and Partitions: ASTM C270-82, type as scheduled.
2. Non-Load Bearing Walls and Partitions: ASTM C270-82, type as scheduled.
3. Pointing Mortar: ASTM C270-82, Type N, max. 2 percent ammonium stearate or calcium stearate by cement volume.

B. Grout: ASTM C476-80, 1 part cement, 3 parts sand, and 2 parts pea gravel mixed to pouring consistency without segregation.

PART 3 EXECUTION

3.01 APPLICATION

A. Mortar Use Schedule:

Masonry Use	Mortar Type Permitted
1. In Contact with Soil	M or S
2. Load Bearing	Refer to Drawings
3. Non-Load Bearing	M, S, or N
4. Fireproofing	M, S, or N

B. Thoroughly mix mortar ingredients in quantities needed for immediate use.

C. Add mortar color and approved admixtures to manufacturer's data, uniformly mixed.

D. Do not use antifreeze compounds to lower freezing point.

E. Grouting - General:

1. Maintain grout core clean of mortar and droppings.
2. Vibrate or agitate during and after placement.
3. Stop grouting 1-1/2 in. below top of masonry if stopping grouting for 1 hr. or more except when completing Work.

F. Low Lift Grouting:
1. Grout spaces having width less than 2 in. at max. 24 in. intervals in lifts of 6 to 8 in. as wall is built.
2. Grout spaces having width larger than 2 in. place or float brick in grout with min. 3/8 in. of grout between brick.

G. Retempering:
1. If water is lost by evaporation, retemper within 2 hrs. of mixing.
2. Do not retemper after 2 hr. limit.

- END OF SECTION -

SECTION 04200

UNIT MASONRY (VENEER)

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
1. Anchors, Reinforcing, and Flashing.
2. Brick Masonry Units.
3. Concrete Masonry Unit.
4. Composite Wall Masonry System.
5. Veneer - Steel Stud Masonry System.
6. Precast Concrete Sills and Coping.

B. Related Work:
1. Section 04100, Mortar.
2. Section 05500, Metal Fabrications.
3. Section 08100, Metal Doors and Frames.
4. Section 08520, Aluminum Windows.
5. Section 09110, Non-Load Bearing Wall Framing Systems.
6. Section 09250, Gypsum Board.
7. Division 15, Mechanical.
8. Division 16, Electrical.

1.02 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer: Provide test reports for each type of brick with report max. 3 yrs. old, developed by independent testing laboratory in accordance with ASTM C67-81 indicating compressive strength, 24 hr. cold water absorption, 5 hr. boil absorption, saturation coefficient, and initial rate of absorption.
2. Installer: Insure all masonry work is directed by skilled mason.

B. Reference Standards:
1. NCMA, Specification for Design and Construction of Load-Bearing Concrete Masonry.
2. BIA, Building Code Requirements for Engineered Brick Masonry.
3. IMIAC, Recommended Practices and Guide for Specifications for Cold Weather Masonry Construction.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
1. Samples: Min. 5 individual brick showing color and texture extreme variations.
2. Test Reports:
a. Manufacturer Certificate indicating compliance

with ASTM C67-^1.
b. Prism Test Report for Load-Bearing Masonry.
3. Certificates: Provide before delivery attesting compliance with Specifications for grade, types, or classes.
4. Shop Drawings:
a. Indicate bar sizes, spacings, locations, and quantity of reinforcing steel with bending and cutting schedules, and supporting and spacing devices.
b. Prepare shop drawings under seal of professional structural engineer registered in State of Project.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store brick off ground to prevent contamination, staining, or defects.

B. Cover materials to protect from elements.

1.05 SITE CONDITIONS

A. Cold Weather Requirement:
1. Comply with IMIAC requirements.
2. Protect in-place masonry construction when air temperature is below 40 deg. F. as follows.
3. Average Daily Air Temperature 40 deg. F. to 32 deg. F: Protect masonry from rain or snow for 24 hrs. after erection.
4. Average Daily Air Temperature 32 deg. F. to 25 deg. F: Cover masonry for 24 hrs. after erection.
5. Average Daily Air Temperature 25 deg. F. to 20 deg. F:
a. Furnish heat sources on both sides of masonry construction.
b. Furnish wind breaks for wind velocity in excess of 15 mph.
c. Cover masonry with insulating blankets for 24 hrs. after erection.
6. Average Daily Air Temperature Below 20 deg. F:
a. Furnish enclosures and heat to maintain air temperature above 32 deg. F.
b. Maintain constructed masonry temperature above 32 deg. F. for 24 hrs. after erection with enclosures and supplemental heat.

B. Hot Weather Conditions: Protect masonry construction from direct exposure to wind and sun when erected in ambient air temperature of 99 deg. F. in shade with relative humidity less than 50 percent.

C. Sequencing: Coordinate placement of items specified in other Sections to be placed with Work of this Section.

D. Protection:
1. Maintain protective boards at exposed corner where

damage may occur due to construction activities.
2. Provide protection without damaging completed Work.
3. At days' end, cover unfinished walls to prevent moisture infiltration.

PART 2 PRODUCTS

2.01 MATERIALS

A. Brick Units:
1. Face Brick:
a. ASTM C216-81, Grade SW for brick in contact with earth and MW for all other locations, Type FBS.
b. Size: Common ., 7-1/2 in.L x 3-1/2 in.D x 2-1/4 in.H.
c. Color Range and Texture: Smooth red.
d. Usage Location: 400 Massachusetts Avenue.
2. Face Brick:
a. ASTM C216-81, Grade SW for brick in contact with earth and MW for all other locations, Type FBS.
b. Size: Match existing units.
c. Color Range and Texture: Match color range of existing units.
d. Usage Location: Existing buildings.

B. Concrete Masonry Units:
1. Concrete Brick: ASTM C55-75(80), Type 1, Normal weight, 4 in. ground face units.

C. Reinforcement, Anchorages, and Ties:
1. Joint Reinforcement:
a. ASTM A82-79, continuous cold-drawn steel wire consisting of two 9 ga. deformed longitudinal side wires welded 16 in. o.c. to continuous 9 ga. diagonal cross wires with side wire spacing 2 in. less than nominal wall thickness.
b. Wire Finish: ASTM A116-81, Class 3 galvanized coating on cross wires.
c. Provide prefabricated ties for intersections and prefabricated corners.
2. Cavity Wall Ties:
a. Wire Diameter: 3/16 in.
b. Shape: Min. 2 in. wide with ends overlapped, rectangular.
c. Length: Select to provide min. 1 in. mortar cover of ends or legs.
3. Dovetail Wire Anchors:
a. Wire: 6 ga. min. 7/8 in. wide.
b. Fabrication: Wire looped and closed.
4. Rigid Anchors - Intersecting Bearing Walls:
a. Size: 1-1/2 in. wide x 1/4 in. thick x min. 24 in. long.
5. Wall Ties - Veneer System: 9 ga. wire ties and strap.
6. Acceptable Manufacturer: Dur-O-Wal, Inc., AA Wire

Products Co., Hohman & Barnard, Hickman.

D. Through Wall Flashing:
   1. Copper/Kraft Paper: 3 oz. per sq. ft. copper bonded to layer of fiber reinforced asphalt and backed with kraft paper.

E. Accessories:
   1. Control Joints: Preformed neoprene.
   2. Joint Filler: Closed cell PVC oversized 50 percent, self-expanding.
   3. Building Paper: Asphalt saturated felt.
   4. Rope Wick: Cotton rope, min. 1/4 in. dia.

F. Precast Concrete Sills:
   1. Portland Cement Concrete: ASTM C150-83a, Type 1, gray, min. 2500 psi.
   2. Slope top surface of sill at min. 15 deg. from horizontal away from building and 1/8 in. in 12 in. from ends to center.
   3. Min. 3/4 in. overhang to drip on lower edge at front of sill.
   4. Provide dovetail anchor slot on back surface.

G. Precast Concrete Copings:
   1. Portland Cement Concrete: ASTM C150-83a, Type 1, gray, min. 2500 psi.
   2. Slope top surface as detailed.
   3. Min. 3/4 in. overhang to drip on lower edge.
   4. Provide dovetail slot for anchoring.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify items provided by other Sections of Work are properly sized and located.

B. Establish lines, level, and coursing and protect from disturbance.

C. Provide temporary bracing during masonry work and maintain in place until building structure provides permanent bracing.

D. Wetting Brick:
   1. Wet brick having absorption rate in excess of 20 gal. per 30 sq. in. to ASTM C67-81 so absorption rate does not exceed this amount.
   2. Comply with cold weather requirements using heated water to reduce brick suction.

E. Clean reinforcement before placing, remove loose rust, ice, and other coatings.

3.02 ERECTION

A. General:
   1. Coursing:
      a. Place masonry in lines and levels indicated.
      b. Maintain courses to uniform width.
      c. Make vertical and horizontal joints equal and uniformly thick.
      d. Pattern Bond: Running.
      e. Bond unexposed masonry units in wythe by lapping min. 2 in.
   2. Joining Work:
      a. Remove loose brick and mortar, clean and lightly wet exposed surface of wet masonry where fresh masonry joins partially set masonry.
      b. Stop off horizontal run by racking back 1/2 length of unit in each course.
      c. Do not tooth masonry without written acceptance.
   3. Tooling:
      a. Tool exposed joints where "thumb-print" hard with jointer slightly larger than width of joint.
      b. Flush cut all joints not tooled.
   4. Tuck Pointing:
      a. Rake min. 1/2 in. to max. 3/4 in. deep.
      b. Saturate joints with clean water.
      c. Fill solidly with pointing mortar and tool joints.
   5. Flashing:
      a. Turn up min. 8 in. and seal to back-up.
      b. Lap end joints min. 6 in. and seal watertight.
      c. Place through wall flashing on bed of mortar.
      d. Cover with mortar.
   6. Weep Holes:
      a. Provide in head joints in first course immediately above all flashing.
      b. Place wick in joint max. 24 in. o.c.
      c. Keep weep holes and area above flashing free of mortar droppings.
   7. Sealant Recesses:
      a. Leave joints around outside perimeters of frames and other wall openings.
      b. Recess Size: Uniform 3/4 in. deep x 1/4 to 3/8 in. wide.

B. Placing and Bonding:
   1. Lay in full bed of mortar, properly jointed with adjacent work.
   2. Do not butter corners of joints or furrow mortar joints excessively.
   3. Fully bond intersections, and external and internal corners.
   4. Perform jobsite cutting with proper tools to provide straight unchipped edges.
   5. Take care to prevent breaking corners or edges.
   6. Rock closures into place with head joints thrown against two adjacent bricks in place.
   7. Do not pound corners and jambs to fit stretcher

units after set in position.

8. If adjustments are made after mortar has started to harden, remove mortar and replace with fresh.

C. Reinforcement and Anchorages:

1. Horizontal Joint Reinforcement:
   a. Install 16 in. o.c.
   b. Place in first and second horizontal joints above and below openings.
   c. Extend min. 16 in. each side of opening.
   d. Place continuously in first and second joint below top of walls.
   e. Lap ends min. 6 in.
2. Anchorage - Veneer Back-Up:
   a. General: Reinforce joint corners and intersections with strap anchors 16 in. o.c.
   b. Masonry Back-Up: Embed wall ties for veneer at max. 24 in. o.c. vertically and 16 in. o.c. horizontally and place ties max. 3 in. o.c. each way around perimeter of openings within 12 in. of openings.
   c. Stud Wall Back-Up: Secure wall ties to back-up for veneer at max. 16 in. o.c. horizontally, 24 in. o.c. vertically, and place ties max. 3 in. o.c. each way around perimeter of openings within 12 in. of opening.

D. Lintels:

1. Loose Steel: Refer to Section 05500, Metal Fabrications, for materials and install as scheduled.

E. Precast Concrete Sills:

1. Flashing: Copper sheet.
   a. Extend beyond ends of sill to first head joint outside jamb of opening, and turn up and outward min. 1 in. at each end.
   b. Extend through brick to exterior face of wall at lower end of flashing and turn down min. 1/4 in. to form drip.
   c. Space weep holes with wick max. 16 in. o.c.
2. Set and anchor sill to masonry and seal flashing penetrations.
3. Seal joints as required to requirements of Section 07900, Joint Sealers.

F. Precast Concrete Copings:

1. Flashing: Copper sheet.
   a. Flash top of wall and extend flashing beyond face of wall and bend downward min. 1/4 in. to form drip.
   b. Space weepholes with wick max. 16 in. o.c.
2. Set and anchor sill to masonry and seal flashing penetrations.
3. Seal joints as required to requirements of Section 07900, Joint Sealers.

G. Control Joints:

1. Do not continue horizontal joint reinforcing across control joints.
2. Install resilient control joint in continuous length by heat or solvent weld to manufacturer's instructions.
3. Refer to Section 07900, Joint Sealers, and size joint as specified for sealant performance.
4. Locate as indicated on Drawings.

H. Built-In Work:
1. As Work progresses, build-in items supplied by other Sections.
2. Place items plumb and level.
3. Metal Door Frames:
   a. Bed anchors in mortar joints.
   b. Fill frame voids solid with mortar.
   c. Fill masonry cores with grout min. 12 in. from framed openings.
4. Do not build-in organic materials subject to deterioration.

I. Cavity Wall:
1. Do not let mortar fall into cavity air space or plug weep holes, clean out properly.
2. Slightly bevel mortar bed to incline toward cavity.
3. As Work progresses, trowel protruding mortar fins in cavity flat on to inner face of wythe.
4. Install cavity vents in veneer 24 in. o.c. horizontally above through-wall flashings, at bottom of walls, and at top of cavity space.
5. Build inner wythe ahead of outer wythe to receive cavity insulation, air/vapor barrier.

3.03 FIELD QUALITY CONTROL

A. Tolerances:
1. Alignment of Columns and Pilasters: Max. 1/4 in. from true line.
2. Variation from Unit to Adjacent Unit: Max. 1/32 in.
3. Variation from Plane of Wall: 1/4 in. in 10 ft. and 1/2 in. in 20 ft. or more.
4. Variation from Plumb: 1/4 in. per story non-cumulative, 1/2 in. in two stories or more.
5. Variation from Level Coursing: 1/8 in. in 3 ft., 1/4 in. in 10 ft., max. 1/2 in.
6. Variation of Joint Thickness: 1/8 in. in 3 ft.
7. Variation from Cross Sectional Wall Thickness: +/- max. 1/4 in.

3.04 ADJUSTING AND CLEANING

A. Cut out any defective joints and holes in exposed masonry and repoint with mortar.

B. Clean all exposed unglazed masonry as follows:
1. Use non-acidic solution to prevent harm to masonry

or adjacent materials.

2. Follow brick manufacturer's recommendations.
3. Use non-metallic tools in cleaning operations.

- END OF SECTION -

SECTION 04500

MASONRY RESTORATION AND CLEANING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
1. Remove items indicated on surface of masonry and for new masonry openings.
2. Repair and rebuild new masonry.
3. Clean masonry surfaces.
4. Repair or replace limestone window sills and lintels.
5. Apply stone strengthener to all existing and new limestone.

B. Related Work:
1. Section 04100, Mortar.
2. Section 04200, Unit Masonry.

1.02 SYSTEM DESCRIPTION

A. Performance:
1. Coordination:
a. Coordinate removal of through-wall penetrations to coincide with construction phasing.
b. Insure all utilities are shut off or capped before removing designated items.
c. Coordinate with mechanical and electrical drawings for items to remain due to systems designated to remain in service.
2. Removals: Items included for removal are indicated on Drawings.
3. Repairs: Items included for repairs are as follows but not limited to:
a. Patch all holes associated with removals specified in this Section or existing due to previous alteration having size of 2 in. or less.
b. For holes larger than 2 in. in size, remove existing damaged brick and replace with matching brick.
c. For openings exposed due to removals, install new backing concrete masonry units, tie veneer brick to backing concrete masonry units, and key matching veneer brick to side and backing masonry.
d. Rake out or cut all joints as required in areas designated to be repointed.
e. Rebuild with matching brick all failing jambs at window locations detailed on Drawings.
f. Inspect all limestone sills and lintels for damage and repair units having minor cracks or loose surface with epoxy.
g. For limestone sills and lintels damaged beyond

repair, replace with new units to match existing.
h. Repoint and finish point all repaired and reconstructed areas.
i. Clean out and repair all cracks in masonry.
j. Backpoint all masonry joints to make building watertight as necessary before cleaning.
k. Use brick to match existing for all repairs and replacements to existing brick and openings.

4. Clean: Areas requiring cleaning are as follows but not limited to:
a. All exposed brick surfaces to receive general cleaing to renew masonry appearance.
b. Spot cleaning not to discolor masonry at locations having graffiti.
c. Clean all limestone sills and lintels to remain in place after repairs or where no repairs are necessary to match new replacement units.

B. Definitions:
1. Replace: Shall mean to furnish and install entirely new element matching original element in material, color, dimension, and design regardless of current condition of element to be matched.
2. Repair: Shall mean to make existing element as nearly new as possible by means and methods indicated for each element.
3. Clean - Masonry: Shall mean to perform chemical cleaning operations as indicated; for general work clean and broom-sweep work site and rinse all areas of newly completed masonry work at end of each working day with clean water at garden hose pressure.
4. Matching: Shall mean replacement materials to have same style, texture, color and color range, and size as existing material with installation processes to match adjacent areas.
5. Masonry Cleaning: Shall mean matching accepted sample panel results using approved methods.

1.03 QUALITY ASSURANCE

A. Qualifications - Applicator:
1. Provide one person to supervise Work of this Section thoroughly familiar with manufacturer's recommended methods, materials, and nature of Work specified.
2. No Contractor will be considered who has not demonstrated through previous experience ability to perform Work required of this Section.

B. Job Mock-Up:
1. Cleaning:
a. Clean designated wall panel including brick, stone, and mortar to desired degree of cleanliness as approved by Architect.
b. Repeat cleaning if first method is unacceptable using different cleaning methods acceptable to

Architect until method and cleanliness is acceptable.

2. Restoration: Provide cutting, pointing, and infill samples for brick walls, infill areas, and pointing areas.
3. Test panels and methods will become standard for Work of this Section.
4. Sample:
   a. Size: In situ infill at locations designated by Architect to include proposed brick, bond, mortar, and joint.
   b. Obtain Architect's approval and install additional areas as required until approval is obtained.
   c. Do not begin Work until sample area is accepted.
   d. Use approved sample as standard for all masonry work built of same material or in same manner.

1.04 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Product Data: Complete list of chemicals and equipment scheduled for use cross-referenced to surface where used.
   2. Samples:
      a. Provide samples of cleaning, mortar patching compound, sealants, repointing compounds in color and texture specified.
      b. Repointing Mortar: Set, dry, and min. 7 days old.
      c. Provide in situ sample of pointing mortars.
      d. Provide cleaning test for brick, stone, and mortar to requirements of job mock-up.
      e. Provide vertical and horizontal cut joint area for review.
      f. Matching brick for infills and repairs.
      g. Provide min. 5 individual bricks showing extreme color and texture variations for matching brick.
      h. Sample masonry panel.
      i. Ties: Refer to Section 04200, Unit Masonry, for type.
   3. Shop Drawings:
      a. Provide setting details of cut stone work and special brick shapes.
      b. Provide details and information on needling, underpinning, shoring, and bracing.
   4. Certificates: Provide certification from manufacturers that cleaning materials and methods to be used are in conformance with manufacturer's recommendations.

1.05 PROJECT CONDITIONS

A. Existing Conditions: Refer to Section 02070, Selec-

tive Demolition, for precautions regarding potential lead-based substances during cleaning operations.

B. Environmental Requirements:
   1. Temperature Restrictions:
      a. Do not lay masonry or stonework, repaint, sealant, wash down, or wet surface when temperature may drop below 40 deg. F. within 24 hrs.
      b. Comply with ANSI A41.1-53 cold weather procedures when temperature may drop below 40 deg. F.
      c. Record daily temperatures, water pressures, and cleaning processes used in Project Log and submit to Architect for review.
   2. Dust Generating Process: Do not perform processes creating dust or dirt when wind exceeds 10 mph.
   3. Conform to all city and health department regulations for cleaning.
   4. Protect public, workers, and property from adverse effects of cleaning.
   5. Remove runoff water generated during cleaning operations by vacuuming unless alternative method is submitted and approved in writing.
   6. Protect adjacent surfaces, glass, and materials.

C. Sequencing:
   1. Existing Masonry:
      a. Complete backpointing and make all surfaces weathertight.
      b. Complete necessary routing of joints and replacement of designated damaged masonry units before starting cleaning processes.
      c. Complete final pointing after cleaning.

D. Scheduling:
   1. Perform cleaning or washing of exterior masonry only during hours agreed with Owner.
   2. Coordinate with work performed on adjacent surfaces.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mortar: Refer to Section 04100, Mortar.

B. Masonry Units:
   1. Refer to Section 04200, Unit Masonry.
   2. Match color range, texture, and size for infill or repairs.

C. Limestone Units: Match color range, texture, size and profile for replacement sills and lintels.

D. Chemical Paint, Asphalt, and Tar Removers:
   1. Water-soluble, biodegradable specially thickened solution to disolve and remove oil-base and latex

paints, varnishes, lacquers, and stains with either animal or vegetable oil-base.
2. Coverage: Variable, 50 to 75 sq. ft. per gal.
3. Acceptable Manufacturer: ProSoCo Model Heavy Duty Paint Stripper or T509, HydroClean Model 715, or ProSoCo Model Asphalt and Tar Remover.

E. Chemical Cleaner - Brick Masonry:
1. Hydro Clean Model HT626 with fine spray application.
2. Other materials may be used if they comply with substitution requirements and tested to acceptance of Architect.

F. Chemical Cleaner - Limestone:
1. Water soluble blend of acidic ingredients and special wetting agents formulated for use on high calcium based limestone.
2. Viscosity: Medium.
3. Precautions:
   a. Use plastic or rubber buckets, gloves, and personal safety equipment to avoid skin and eye contact.
   b. Use in well ventilated areas.
4. Acceptable Manufacturer: ProSoCo Inc. Model Limestone Restorer, Syndet Products Inc. Model Once Again Lime Klean.

G. Sealers: Refer to Section 07900, Joint Sealers.

H. Paint: Refer to Section 09900, Painting.

I. Epoxy:
1. Use for repairs of masonry and stone.
2. Acceptable Manufacturer: Sika Chemicals Model Colma Dur Gel.

J. Limestone Stone Stengthener:
1. Single component stone consolidator and water repellant.
2. Color: Neutral.
3. Acceptable Manufacturer: ProSoCo Model Conservare H Stone Strengthener.

K. Reinforcements, Anchors, and Ties: Refer to Section 04200, Unit Masonry.

L. Concrete Masonry Units: Refer to Section 04200, Unit Masonry.

2.02 EQUIPMENT

A. Fluid Blasting Pump Unit:
1. Pressure Rating: Adjustable, 800 to 1500 psi.
2. Flow Rate: 5 gal. per minute.
3. Spray Tip or Nozzle: Min. 45 deg. fan.
4. Check pressure at nozzle and clean filters daily.

PART 3 EXECUTION

3.01 PREPARATION

A. Protection:
   1. General:
      a. Remove and store fixtures, fittings, finish hardware, and accessories in areas affected by restoration and cleaning processes.
      b. Close off, mask, seal, and board-up designated areas, materials, and surfaces to protect from damage.
      c. Fence off work area.
      d. Secure chemicals in secure location when not in use and in protected location when in use.
   2. Non-Masonry Surfaces:
      a. Thoroughly test glass, aluminum, and other surfaces where damage could result due to cleaning materials and provide protection as required.
      b. Trim and Glass: Use protective materials compatible with cleaning chemicals where cleaning chemicals cannot be diverted from glass surfaces.

B. Rebuilding:
   1. Cut out damaged and deteriorated materials with care to prevent damage to adjacent remaining materials.
   2. Needle, shore, and underpin structure as necessary in advance of cutting out materials.
   3. Cut away loose or unsound materials to provide firm and solid bearing for new work.
   4. Build-in cut away areas to match and align with existing areas insuring joints and coursing are true and level, and faces are plumb and in-line.
   5. Ensure anchors, ties, reinforcing are correctly located and built-in, and tie veneer brick to backing concrete masonry units.
   6. Build-in all openings, accessories, and fittings.
   7. Perform all backpointing required to make openings and joints watertight.

3.02 APPLICATION

A. Cleaning:
   1. Chemical Cleaning - Masonry:
      a. Apply cleaner following manufacturer's recommendations.
      b. Comply with test results and sample patch panel to apply materials.
      c. Allow solution to remain on surface as required to meet test results.
      d. Rinse treated surface using water at 800 to 1500 psi water rinsing equipment in conformance with test results.

e. Reapply for difficult stains as required and lightly scrub surface as necessary.
f. Rerinse surface as required to remove chemical cleaner and dirt.

2. Paint, Tar, and Miscellaneous Materials Removal:
a. Apply paint remover as necessary to dissolve and remove paint where required to comply with test performed on designated location in advance for methods of application.
b. Use heavy nap roller or brushes.
c. Allow sufficient time for remover to penetrate all layers of paint.
d. Wire bruch two east rosettes as designated to prepare surface for repainting.
e. Remove using max. 1000 psi high pressure water rinse.
f. Use chemical cleaning processes to neutralize and thoroughly remove paint remover from surface.
g. Collect runoff in containers, label containers, and dispose of containers at approved site.

3. Do not proceed with cleaning operations until masonry is weathertight.

B. Pointing and Patching:
1. Cut and Point Mortar Joints:
a. Preserve joint sizes.
b. Do not damage arrises during cutting.
c. Prepare joints for repointing by cutting to min. 3/4 in. depth or deeper as necessary until sound mortar is encountered.
d. Clean out all holes to be patched using hand tools or small drills.

2. Filling Mortar Joints and Holes:
a. Match filling of mortar joints and holes with surrounding surfaces.
b. Apply mortar in 1/2 in. lifts, compacting mortar into hole or joint using rod or tool smaller than hole or joint.
c. Pre-wet joints and holes thoroughly before pointing.
d. Allow min. 6 hrs. airing between lifts.
e. When last layer has been applied, strike off mortar flush.
f. When mortar is thumb-print hard, tool to match adjacent surfaces and joints.

3. Cleaning Excess Mortar:
a. Do not stain adjacent surfaces with mortar.
b. Brush down and rinse all adjacent surfaces after mortar is set.
c. Use only soft brush, clear water, and cloths.
d. Do not use acids or TSP methods to clean adjacent surfaces.

C. Brick Patching:
1. Install new matching face brick in all large hole openings or other areas designated.

2. Match bonding, coursing or other areas, and appearance of adjacent cleaned or uncleaned brick.
3. Ties and Concrete Masonry Units: Refer to Section 04200, Unit Masonry, for requirements.

D. Epoxy Application:
1. Clean and cut out cracks using handwork, do not use mechanical cutting.
2. Apply epoxy against stop, to manufacturer's instructions.
3. Finish point last 1 in. of joint with mortar, tooled and color matched to adjacent masonry.

3.03 CLEANING

A. Remove all debris and dispose in approved manner.

B. Remove all spots, oils, or stains on adjacent surfaces and areas.

C. Leave entire job clean.

- END OF SECTION -

SECTION 04600

CONCRETE UNIT MASONRY (LOAD-BEARING)

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Attention is directed to the printed form of Contract and Sections A through F of these specifications which are hereby made a part of this Section of the specifications.

1.02 SCOPE OF WORK

A. The work under this section consists of furnishing all labor material and equipment to complete masonry work as shown on the drawings and as specified herein, and includes, but is not limited to the following:

1. New concrete masonry unit walls.

2. Patching of existing masonry walls as required in conjunction with structural modifications and miscellaneous metals installations.

3. Masonry flashing, reinforcement, ties, mortar grout and all accessories required by the Contract Documents and/or necessary to complete the work of this section.

4. Placing of steel and concrete lintels.

1.03 RELATED ITEMS TO BE INSTALLED ONLY

A. The following related items are designated to be furnished under other Sections and installed as work under this section.

1. Setting of door anchors.

2. Setting of louvers and vents.

3. Anchor bolts, expansion bolts and loose steel lintels.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Section __ Cast in Place Concrete

B. Section __ Brick Masonry

C. Section __ Masonry Mortar

D. Section __ Structural Steel

1.05 PROTECTION

A. All materials shall be carefully handled in transit and on the site so as to keep units whole, edges sharp, and faces clean and undamaged. New masonry units shall not be dumped but shall be delivered in pallets, handled individually or in suitable groups, and properly stacked.

B. Masonry units of all types shall be protected from wetting by rain or snow and shall be kept covered when not in use.

C. Manufactured materials such as cement and lime shall be delivered and stored in their original containers, plainly marked with product identification and manufacturer's name.

D. Materials in broken containers or in packages showing water marks or other evidence of damage shall not be incorporated into the work and shall be removed from the site.

1.06 JOB CONDITIONS

A. The Contractor shall be fully responsible for the proper execution and performance of the work described herein. It shall be his responsibility to inspect all installation conditions and correct any conditions which may affect his work adversely. He shall report to the Architect, prior to commencing any portion of his work, any unsuitable installations conditions for his portion of the work.

B. Make provisions for protecting masonry work in cold weather including enclosing and heating the work area and materials.

C. Materials shall be preconditioned and finished work protected as follows:

1. Mean Daily Air Temperature 40-32: Heat mixing water or aggregate to 70F minimum and 160F maximum. Protect masonry from rain and snow for 24 hours.

2. Mean Daily Air Temperature 32-25: Heat mixing water and aggregate to 70F minimum and 160F maximum. Completely cover masonry for 24 hours.

3. Mean Daily Air Temperature 32-25: Heat mixing water and aggregate to 70F minimum and 160F maximum. Provide windbreak for wind velocity in excess of 15 mph. Cover masonry with insulating blankets for 24 hours and provide heat sources on both sides of masonry construction.

4. Mean Daily Air Temperature 25-20: Heat mixing water and aggregate to 70F minimum and 160F maximum. Provide enclosures and heat to maintain air temperature above 32F. Temperature of masonry units shall be 30F minimum when laid. Maintain masonry above 32F for 24 hours by enclosures supplemental heat.

D. No anti freeze or accelerator admixtures will be allowed in mortar.

E. No frozen work shall be built upon, and in any such work shall be removed.

F. Cover the tops walls at end of each day's work with waterproof membrane extending minimum of two feet down each side and securely fastened.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Hollow load bearing: ASTM C 90.

B. Solid Loadbearing: ASTM C 145, where indicated as "solid".

C. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" (15-5/8" x 7-5/8" actual), unless otherwise indicated.

D. Special Shapes: Provide where needed for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

E. Grade: N

F. Weight Classifications: Lightweight and normal weight units unless otherwise indicated.

G. Cure units in moisture-controlled atmosphere or in an autoclave at normal pressure and temperature to comply with ASTM C 90, Type I.

H. Exposed faces: Provide manufacturer's standard color and texture, unless otherwise indicated.

2.02 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I free from water soluble salt and alkalies. Provide cement that exhibits no efflorescence when tested in conformance with standard efflorescence test of ASTM C67 modified to use 2" x 7" x 2-1/2" mortar samples consisting of a mixture of 1 part by weight of cement under test and 2 parts of Ottawa sand mixed to a flow of 100% with water to be used at project site. Mortar samples shall be aged one week prior to testing. Provide natural color to white cement as required to produce required mortar color.

B. Hydrated Lime: ASTM C 207, Type S.

C. Aggregate for Grout: ASTM C 404.

D. Aggregate for Mortar: ASTM C 144, well graded except for joints less than 1/4" use aggregate graded with 100% passing the No. 16 sieve.

E. Colored Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

F. Water: Clean and portable.

2.03 MASONRY REINFORCING, TIES, AND ANCHORS

A. Masonry Veneer to Metal Stud/Gypsum Sheathing System Anchors:

1. Provide Hohmann and Barnard, Inc., DW-10 masonry wall veneer anchors consisting of 3/16" diameter vee ties with drip and 12 gauge, galvanized steel wall anchors or Architect approved equal product.

B. Horizontal Joint reinforcing and Masonry to Masonry Ties:

1. Provide truss type, welded wire units fabricated from 9 gage ASTM A82 cold-drawn steel wire with deformed side rods and plain cross rods spaced not more than 16" o.c. Provide continuous units in length not less than 10' with prefabricated corner (1) and tee (T) units. Provide one side rod for each concrete masonry face shell. Provide two piece 3/16" diameter steel wire, adjustable tab-type units for tying face brick wythe to back-up wythe.

a. Size: Not more than 2" less than width of wall to provide at least 1/2" mortar cover from interior face and at least 5/8" mortar cover from exterior face.

C. Masonry Veneer to Concrete Anchors:

1. Provide hot-dip galvanized steel dovetail slots and 1" wide corrugated anchors of the size and type of suit construction requirements; include filler strips. Fabricate slots from 24 gage galvanized steel and anchors from 16 galvanized steel unless otherwise indicated.

a. Advise concrete installer of specific requirements regarding his placement of inserts which are to be used by the masonry installer for anchoring of masonry work.

D. Masonry to Structural Steel Anchors: Where masonry is indicated to be anchored to structural framework, provide 2-piece, flexible anchors which will permit horizontal and vertical movement of masonry but will provide lateral restraint.

E. Miscellaneous Anchors and Ties: Provide straps, bars, bolts, rods, and wire ties fabricated from not less than 16 gage sheet metal, 3/8" diameter rod stock, or 3/16" diameter steel wore, unless otherwise indicated.

F. Reinforcing Bars: Deformed steel, ASTM A 615, grade 60 for bars No. 3 to No. 18.

G. Galvanizing: For all reinforcing, ties, and anchors which extend into exterior wythes, provide units with hot-dip galvanized coating after fabrication. (ASTM A153, Class B-2, 1.5 oz./sq. ft.)

2.04 MISCELLANEOUS MASONRY ACCESSORIES

A. Bond Breaker Strips: 15-lb. roofing felt complying with ASTM D 226, or ASTM D 227.

B. Premolded Control Joint Strips: Solid rubber strips with a Shore A durometer hardness of 60 to 80, designed to fit standard sash block and maintain lateral stability in masonry wall, size and configuration.

2.05 MORTAR AND GROUT MIXES

A. Do not use admixtures or anti-freeze agents.

B. Do not use calcium chloride in mortar or grout.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specifications, for types of mortar required. Use known volume measure, do not batch by shovel.

1. Limit cementious materials in mortar to portland cementlime, masonry cement is not acceptable.

2. Use type M mortar for masonry below grade and in contact with earth, and where indicated.

3. Use type S mortar for reinforced and loadbearing masonry and where indicated.

4. Use type N mortar for face brick and block above grade, for other exterior, above grade non-loadbearing walls and for interior non-loadbearing walls.

D. Colored Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1-to-10, by weight.

1. Mix to match Architect's sample.

E. To prevent color variation, do not retemper mortar containing color pigments. Discard all mortar containing pigments that has stiffened due to evaporation or hydration.

F. Grout for Unit Masonry: Comply with ASTM C 476 for grout for use in construction of reinforced and nonreinforced unit masonry. Use grout of consistency indicated or if not otherwise indicated, of consistency at time of placement which will completely fill all spaces intended to received grout.

PART 3 EXECUTION

3.01 CMU WALLS

A. Lay masonry in running bond or in special coursing as indicated on drawings. Masonry coursing shall be plumb, true to line, with level courses accurately spaced. Cut exposed masonry with power saw. Chipped or cracked units will not be used in exposed faces.

B. Where fresh masonry joins partially set masonry, remove loose work, clean and lightly wet exposed surface of set masonry. Toothing is not permitted.

C. Joints shall be approximately 3/8" thick. Tool exposed joints when thumbprint hard with a stainless steel jointer at least 16" long and with a 1/2" diameter. At completion of the work, cut out and repoint all holes and defective joints.

D. As the work progresses, install, as detailed and as directed, lintels, anchors, and other built-in work. Place lintels in full mortar bed.

E. Walls shall be dry-brushed at the end of each day's work.

F. Where adjustments must be made after mortar has started to set, masonry unit shall be removed and the mortar in the joint replaced with fresh mortar.

G. The Contractor shall line all door and window heads and openings properly to block coursing without necessity of altering the head. Failure to comply will result in rejection of the installation. Edges if masonry openings shall be finished plumb.

H. Do all cutting and patching of masonry required for the work.

I. Bed and grout structural members and items coming in contact with masonry where grouting is required, including metal frames set in masonry.

J. No masonry shall be built when the ambient temperature is below 50F unless heated enclosures are provided and a minimum temperature of 40F is continuously maintained during and for at least 48 hours after completion of the work.

K. Installation of hollow metal frames and doors:

1. Hollow metal frames shall be set level, plumb and square and properly anchored at jambs.

2. Bed and grout frame anchors and slush frames full of mortar as the wall is carried up.

3. Doors shall be hung so that operation is smooth and free.

L. Lay concrete blocks in full beds of mortar. Do not moisten block. Apply enough mortar at bed and end joints to allow excess mortar to be forced out both sides of face shell. Ridges occurring on bearing surfaces of profile block shall

be removed sufficiently to permit reinforcing to lie flat without increasing joint thickness.

3.02 HORIZONTAL REINFORCING

A. Provide longitudinal steel reinforcement in all walls and partitions constructed in whole or in part of concrete masonry units.

1. Provide and place reinforcing in bed joints as shown on the drawings.

2. Lap reinforcement at least 6" at splices. Cut and bend at least 18" at corners, in accordance with manufacturer's printed recommendations, or use manufacturer's standard pre-fabricated corners. Discontinue reinforcement at all vertical control joints.

3. Install manufacturer's standard pre-fabricated "tee" member at all intersections of concrete block work. Place "tee" members in the same joints as longitudinal reinforcing.

END OF SECTION 04600

DIVISION 5

METALS

SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Attention is directed to the printed form of Contract and Sections of these Specifications which are hereby made a part of this Section of the Specifications.

1.02 SCOPE OF WORK

A. The scope of work consists of all labor, materials and equipment necessary to complete the structural steel work as shown on the drawings and specified herein including installation of elevator rail support frames.

B. Refer to other sections of the specifications to determine the type and extent of work therein affecting the work of this trade whether or not such work is specifically mentioned in this Section.

1.03 REQUIREMENTS AND STANDARDS

A. Any material or operation specified by reference to the published specifications of a manufacturer, the American Society for Testing and Materials (ASTM), the American Institute of Steel Construction (AISC), the American Welding Society (AWS), the Industrial Fasteners Institute (IFI), the Steel Structures Painting Council (SSPC), the American National Standards Institute (ANSI), or other published standard, shall comply with the standard listed.

1.04 SAMPLES AND SHOP DRAWINGS

A. Samples and shop drawings are to be submitted to the Architect for approval in accordance with Section 1C-Submittals.

B. Shop drawings, erection drawings, certifications and schedules properly checked and coordinated with other parts of the construction are to be submitted to the Architect for approval. Elevations and dimensions must be verified with field measurement.

C. Shop drawings shall be complete and shall include all

information necessary for fabrication and erection of the component parts of the structural work. They shall indicate size and weight of members - type and location of shop and field connections, the type size and extent of all welds, and the welding sequence when required. The welding symbols used on the Shop Drawings shall be as adopted by the American Welding Society.

D. The approval of shop drawings will be for size and arrangement of principal and auxiliary components. Any error in dimensions shown on shop drawings shall be the responsibility of the Contractor.

E. Fabrication of any material, cutting of any holes or performance of any work shall not proceed until shop drawings have been approved by the Architect.

1.05 QUALIFICATIONS

A. Qualifications of high-strength bolting procedures and operations shall be as specified under "Erection" in this Section.

B. Qualifications of welding procedures and operations shall be as prescribed in "Standard Qualification Procedure" of the American Welding Society.

1.06 PRODUCT HANDLING

A. Members shall be delivered in the order required for erection so as not to cause delay in other parts of the work.

B. Unloading and handling shall be by methods which will not cause injury of any kind to the member.

C. Handle, transport and stack all materials carefully to prevent deformation or damage. Store all Structural Steel members carefully on substantial timbers and blocking, so arranged, that steel will not be in contact with the floor. Take care to prevent the accumulation of foreign matter on the steel.

PART 2 PRODUCTS

2.01 GENERAL

A. Structural steel shapes and plates shall be newly rolled steel conforming to ASTM A-36. Tubular pipe columns shall conform to ASTM A500, Grade B.

B. Anchor bolts shall conform with ASTM A-307.

C. Connection bolts shall conform with ASTM A-325.

D. Filler metal for welding shall conform to AISC code, Section 1.4.5.

E. Paint for shop coat shall be Red Oxide Primer as approved by the Architect and shall be at least 2 mils thick.

F. Expansion bolts shall be "HiltiKwik Bolt", "Sleeve Anchors" by ITT Phillips or an approved equal of the sizes and spacings shown on the drawings.

2.02 FABRICATION

A. Applicable Standards:

1. The fabrication of structural steel shall be in accordance with the AISC Specifications amended to date.

B. Provision for attachment of other materials:

1. Punch and drill steel for attachment of other materials indicated on Drawings or noted in Specifications to be attached to the steel.

C. Shop connections shall be welded or high-strength bolted.

D. Welding:

1. Welding procedures and operations shall be as specified under "QUALIFICATIONS" paragraph in this Section.

E. Oxygen Cutting:

1. Manual oxygen cutting shall be done only with a mechanically-guided torch.

F. Cutting of openings in structural steel differing from, or in addition to those shown on approved shop drawings, will not be permitted without written approval of the Architect.

G. Fabricate in the shop to the greatest extent possible. Arrange all members and connections to be shop welded and field bolted wherever possible. Detail connections shall develop full design strength of the member.

H. Diameter of holes in bolted parts shall be 1/16" greater

than the nominal diameter of the bolt. No unfair holes will be accepted, and enlargement of holes shall not be accomplished by burning. Burrs resulting from drilling or punching shall be ground to the surface of the material. Shearing and punching shall be done cleanly so as not to deform or mar adjacent surfaces.

2.03 QUALITY CONTROL

A. The fact that steel work has been accepted at the shop shall not prevent its final rejection at the job site or even after it has been erected, if it is found to be defective in any way.

2.04 PAINTING

A. The painting of structural steel shall be in accordance with the SSPC Specifications.

B. Unless specifically excluded, structural steel shall receive one shop coat of primer paint.

C. Surfaces requiring paint shall be painted only to within two inches of any field weld. If, for any reason, the surface to be field welded is painted, such paint shall be completely removed in the shop within the stated limits, before field welding.

D. Thoroughly clean all steel to be painted of all loose mill scale in accordance with Structural Steel Painting Council Standards SP-2.

2.05 HOT DIP GALVANIZING

A. Except for Stainless steel, all steel items specified herein and as shown on the Drawings for exterior exposed to the weather use, shall be hot dipped galvanized after fabrication. All interior and exterior work to be embedded into masonry or concrete shall be hot dipped galvanized after fabrication. The fabricator shall clean all slag and welds prior to galvanizing process and touch-up all scrathes and zinc removed by drilling, welding, etc., with two (2) coats of zinc rich compound.

B. Hot dipped galvanized shall conform to the following ASTM Designations:

1. Steel Pipe A-120

2. Structural Steel Shapes A-123

3. Assembled Steel Products A-386

4. Steel Sheets A-525

5. Steel Hardware A-153

C. This Contractor shall submit to the Architects, a notarized statement from the galvanizing plant certifying that all items and materials to be hot dipped galvanized conform to the ASTW requirements listed herein. The statement shall include the list of items and material.

PART 3 EXECUTION

3.01 ERECTION

A. Except as otherwise indicated on Drawings or specified, the erection of structural steel shall be in accordance with AISC Specification.

B. Field Connections:

1. Shall be welded or friction-type high-strength bolted.

2. Filler beams shall have framed or seated beam connections using 3/4 inch diameter (min.) high-strength bolts in accordance with requirements of the AISC "Manual of Steel Construction".

C. High-Strength Steel Bolts

1. Installation shall be performed by using pneumatic powered impact wrenches with sufficient capacity and on adequate supply of compressed air or installation shall be performed in accordance with the turn-of-nut method outlined in the AISC "Specification for Structural Joints using ASTM A-325 or A-490 Bolts", with the following modifications:

a. Use a hardware washer under either the bolt head or nut, whichever is turned in tightening.

b. Qualification of high-strength bolting procedures and operations shall be as specified under Qualifications paragraph in this Section.

D. Welding shall be continuous except where tack welding is specifically permitted. Tack welding will not be permitted on exposed surfaces. All exposed welds shall be ground smooth.

E. Where structural joints are made by welding, the details of all joints, the techniques of welding employed, the appearance and quality of welds made, and the methods used to correct defective work shall conform to requirements of the AISC and AWS codes.

F. Shop weld whenever practical.

G. Welds shall be made only by welders who have previously been qualified by tests as prescribed in AWS "Standard Qualifications Procedure" for the type of work required.

H. The use of a gas cutting torch in the field for correcting fabrication errors will be permitted on framing members only when the prior written approval of the Architect has been obtained for each specific condition.

I. Erect steel plumb and true. Furnish all necessary anchors, sleeves, shims, etc., for attachment to work of other trades. Provide temporary bracing and guys in insure stability at all times.

J. Touch-up steel members where factory prime coat has been burned, abraded or otherwise damaged. Paint all welds, bolts, etc., that remain exposed to view with same paint used for shop coat.

K. All anchor bolts shall be set to correct locations by template.

L. All column leveling plates shall be set level to correct elevations and the entire bearing area under plates shall be grouted solid with an approved non shrinking grout.

3.02 LOOSE LINTELS

A. All loose lintels, loose angles, relieving angles, etc., not shown on the structural drawings and/or specified in Section 5B shall be supplied under this Section in accordance with the General and Miscellaneous Notes contained on the structural drawings schedule. Supply one angle for each 4" thickness of masonry. Longer leg shall be set vertically. Install lintel angles over each masonry opening. At 4" thick partitions install lintels as detailed. All exterior and interior loose lintels exposed to the weather or enclosed in exterior walls shall be galvanized.

B. Lintels shall be 6" longer than width of masonry openings.

3.03 FIRE ESCAPE CERTIFICATION

A. The fire escapes to remain shall be repaired to allow a 100 pound per square foot live load. All rusted unsound material shall be cut out and replaced in a manner acceptable to the structural engineer. All surface rust shall be wire brushed to the base metal and painted with top (2) coats of zinc rich paint and one (1) finish coat. All fastenings to the masonry shall be checked and reinforced as necessary.

B. The Contractor shall engage a registered professional engineer who shall Certify that the fire escapes comply with all the requirements of the City of Boston and the Commonwealth of Massachusetts.

3.04 TESTING

A. All welding, riveting and bolting performed shall be subject to inspection and tests by an independent testing laboratory selected by the Owner.

B. The Contractor shall cooperate with the inspectors and shall provide convenient to all parts of the work for the purpose of inspection.

END OF SECTION 05120

SECTION 05500

METAL FABRICATIONS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
1. Steel.
2. Aluminum.
3. Fasteners.
4. Finishes.
5. Railings.
6. Lintels.
7. Ladders.
8. Miscellaneous Framing and Supports.
9. Metal Flower Boxes.
10. Security Grilles.
11. Exterior Fire Escapes and Balconies.

B. Related Work:
1. Section 04200, Unit Masonry.
2. Section 05510, Metal Stairs.
3. Section 06100, Rough Carpentry.
4. Section 09900, Painting.

1.02 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer: Firm with min. 5 years in custom type fabrication.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
1. Shop Drawings:
a. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
b. Provide erection drawings complete with elevations and details.
c. Indicate welded connections and net weld lengths using standard AWS symbols.
d. Provide shop drawings bearing professional stamp and signature of structural engineer licensed in State of Project.
2. Assembly, Erection, and Installation Drawings and Manuals.
3. Material, Equipment, and Fixture Lists.
4. Test Reports.

PART 2 PRODUCTS

2.01 MATERIALS

A. General Requirements: For fabrication of miscellaneous metal work exposed to view in finished Work, use only materials which are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness.

B. Steel:
   1. Structural Steel: ASTM A36-77a.
   2. Steel Plates for Bending or Cold Forming: ASTM A283-79, Grade C, thickness shown for raised pattern safety plates is exclusive of projected pattern.
   3. Steel Tubing: ASTM A501-80, hot-formed, furnace butt welded, or seamless process.
   4. Steel Bars and Bar Size Shapes: ASTM A675-79, Grade 65, or ASTM A36-77a.
   5. Steel Pipe: ASTM A53-80, Type S, Grade A, suitable for close coiling, black finish unless galvanizing is required; standard weight (Schedule 40), unless otherwise indicated or required to satisfy performance criteria.

C. Aluminum:
   1. Extruded Bars, Rods, Wire, Shapes, and Tubes: ASTM B221-80.
   2. Extruded Structural Pipe and Tube: ASTM B429-79.
   3. Sheet and Plate: ASTM B209-81.
   4. Standard Structural Shapes, Rolled or Extruded: ASTM B308-80.

D. Fasteners:
   1. Bolts and Nuts: ASTM A307-80, Grade A bolts.
   2. Machine Screws: Carbon steel, cross-recessed, flathead, tensile strength 60,000 psi. min.
   3. Expansion Bolts: "Cinch" type, galvanized.
   4. Concrete Inserts:
      a. Threaded or wedge type, galvanized ferrous castings, either malleable iron ASTM A47-77 or cast steel ASTM A27-80.
      b. Provide bolts, washers, and shims as required, hot-dip galvanized, ASTM A153-80.
   5. Fasteners and Anchorage Devices: Type, grade, class, best suited for respective purpose; galvanized for exterior use.

E. Galvanizing:
   1. ASTM A153-80, Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   2. ASTM A123-78, Zinc Coating (Hot-Dip) on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip.
   3. ASTM A386-78, Zinc Coating (Hot-Dip) on Assembled Steel Products.

F. Paint:
   1. Ferrous Metal Primer: SSPC Paint 2 or SSPC Paint 3

compatible with finish coats of paint.
2. Galvanizing Repair Paint: Zinc-rich paint for repairing galvanized surfaces and field welds in galvanized steel.
3. For Separating Dissimilar Metals: SSPC Paint 12.

G. Anodized Coatings:
1. Continuous, fully sealed, free from powdery surfaces and conforming to Architectural Class I, 27.0 mg. per sq. in.
2. Color: As selected.
3. Coating Thickness: 0.70 mil., ASTM B244-79.

H. Electrostatic Paint:
1. Use 70 percent Kynar 500 fluorocarbon resin.
2. Color: As selected.
3. Film Thickness:
   a. Primer: 0.4 mil.
   b. Finish Coat: 1.3 mil.
4. Substrate: Aluminum or G90 galvanized steel as detailed.
5. Application: Pretreat, prime, and oven bake finish to coating manufacturer's specifications.
6. Acceptable Manufacturer: DeSoto Inc. Model Fluropon, PPG Industries Model Duranar, Glidden Model Nubelar.

2.02 FABRICATION

A. Supplemental Parts: Include supplementary parts necessary to complete miscellaneous metalwork though not definitely shown or specified.

B. Measurements and Dimensions:
1. Verify measurements and dimensions at job site.
2. Cooperate in coordination and scheduling of Work of this Section with work of related trades, with attention given to installation of items embedded in concrete and masonry not to delay job progress.

C. Forming Metal Fabrications:
1. Exposed Work: Form true-to-line and level with sharp edges and ease exposed edges at 1/32 in. radius.
2. Exposed Connections: Form with hairline joints, flush, and smooth; use concealed fasteners where possible, with exposed threaded portion of bolts and screws cut off flush with adjacent metal.
3. Built-In Work: Form metal work built in with concrete or masonry for anchorage, or provide with suitable anchors, expansion shields, or other anchoring devices shown or required to provide support for intended use.

D. Welds:
1. Make joints as strong and rigid as adjoining sections.

2. Make welds continuous along entire line of contact except where spot welding is indicated.
3. Grind exposed welds flush and smooth to match and blend with adjoining surfaces.
4. Welding Requirements: AWS D1.1.

E. Threaded Connections:
1. Make threaded connections up tight so threads are entirely concealed.
2. Abutting Bars: Shouldered and headed, doweled and pinned.
3. Rivet, Bolt, and Screw Heads: Flat and countersunk in exposed work and elsewhere as required.
4. Carefully machine, fit, and secure removable members by Allen set screws of proper size and spacing.

F. Galvanizing: Galvanize exterior ferrous metal work and items embedded in concrete after fabrication.

G. Preassembly:
1. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly.
2. Disassemble units only as necessary for shipping and handling limitations.
3. Clearly mark units for reassembly and coordinated installation.
4. Provide alignment and splice plates for accurate field fit.

H. Shop Painting:
1. General: Shop paint miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces, and edges to be field welded, and galvanized surfaces, unless otherwise specified.
2. Cleaning and Preparation:
   a. Clean and prepare metal surfaces before applying shop coat.
   b. Remove rust and mill scale in accordance with SSPC SP-3 except conform to SSPC SP-7 where required for special paint or coating.
   c. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1.
3. Priming:
   a. Immediately after surface preparation, apply primer in accordance with manufacturer's instructions.
   b. Use painting methods which will result in full coverage and give a dry film thickness of 2 mil min.
4. Painting:
   a. Apply one shop coat to fabricated metal items.
   b. Apply two coats of paint to surfaces inaccessible after assembly or erection.
   c. Change color of second coat to distinguish it from first.

I. Railings:
   1. Provide railings of design and dimensions shown.
   2. Smooth bends and welded joints ground smooth and flush.
   3. Design and construct to withstand 200 lb. load, as specified, applied at any point, downward or horizontally.
   4. Provide complete with all sleeves, brackets, bolts, and fastening devices as required for complete installation.
   5. Finish: Electrostatic paint.

J. Loose Lintels:
   1. Provide loose steel lintels as shown and as required over openings in masonry walls, partitions, and shafts for installation under Section 04200, Unit Masonry.
   2. Where metal door frames are provided with specified integral head reinforcement, provide loose lintels only for such openings 3 ft. wide and wider.

K. Miscellaneous Framing and Supports:
   1. Provide steel framing and subframing shown on Drawings and not specifically mentioned to be provided as part of work of other trades.
   2. Fabricate miscellaneous units to sizes, shapes, and profiles shown or, if not shown, of required dimensions to receive adjacent other work to be retained by framing.
   3. Equip units with integrally welded anchors for casting into concrete or building into masonry.

L. Fixed Vertical Steel Ladders:
   1. Comply with ANSI A14.3-74.
   2. Provide continuous 1/2 in. x 2-1/2 in. steel rails spaced 18 in. apart and 3/4 in. dia. solid steel rungs spaced 12 in. o.c.
   3. Weld and grind smooth and flush at outside of rails.
   4. Support at top and bottom and intermediate points spaced max. 60 in. o.c.
   5. Use welded or bolted steel brackets to hold ladder 7 in. clear of wall surface and other obstructions.
   6. Extend rails 42 in. above top rung and return rails to wall or structure.
   7. Non-Slip Rungs: Provide non-slip surface on top of each rung using aluminum oxide set in epoxy resin adhesive.

M. Metal Flower Boxes:
   1. Fabricate to shape and size detailed using aluminum.
   2. Accurately reproduce pforiles and bends.
   3. Make intersections sharp, even, and true.
   4. Reinforce work as required for strength, appearance, and mounting.

5. Conceal nails and fasteners where possible.
6. Lock and lap and rivet running joints and seal to requirements of Section 07900, Joint Sealers.
7. Finish: Electrostatic paint.

N. Security Grilles:
1. Material: Low carbon steel, wrought steel forgings.
2. Bars:
   a. Profile: Square.
   b. Size: 1/2 in. x 1/2 in.
   c. Joints: Prepunched vertical bar with horizontal bar slid through punched hole.
3. Frame:
   a. Square corners, welded.
   b. Weld bar grille to frame.
4. Acceptable Manufacturer: Barry Craft Model Pierced Bars.

O. Exterior Fire Escapes and Balconies:
1. General:
   a. Custom fabricate steel fire escape consisting of platforms, connection ladder sections, railings, and retractable lower ladder section.
   b. Support fire escape on brackets attached to building walls with platforms at exits.
2. Platform:
   a. Type: Welded grate consisting of vertical bars 2 in. o.c. and support angles 3 ft. o.c., with 1/2 in. dia. steel pickets 6 in. o.c. and flat bar railing.
   b. Platform Size: Refer to Drawings.
3. Ladder Section:
   a. Comply with ANSI A14.3-74.
   b. Provide continuous 1/2 in. x 2-1/2 in. steel rails spaced 18 in. apart and 3/4 in. dia. solid steel rungs spaced 12 in. o.c.
   c. Weld and grind smooth and flush at outside of rails.
   d. Non-Slip Rungs: Provide non-slip surface on top of each rung using aluminum oxide set in epoxy resin adhesive.
   e. Lower Section: Retractable to 10 ft.-0 in. above finished grade.
4. Railings: As specified in this Section.
5. Finish: Shop prime, field paint to requirements of Section 09900, Painting.

PART 3 EXECUTION

3.01 INSTALLATION

A. Bolts and Plugs:
1. Except where otherwise specified for particular item of Work or for built-in Work, fasten metal work to solid masonry with expansion bolts and to hollow block with toggle bolts.

2. Do not permit fastening to wood plugs in masonry.
3. Drill holes for plugs or bolts to exact diameter of plug or bolt, using a rotary drill for concrete and a percussion drill for other masonry.
4. Provide screws threaded full length to head of screw.

B. Install Work as shown, plumb, level, and in-line with adjacent materials.

C. Provide fastenings as indicated on Drawings, specified, or as shown on shop drawings.

D. Handrails and Railings:
1. Tolerances:
   a. Posts: Max. 1/8 in. in 12 ft., plumb.
   b. Rails: Max. 1/8 in. in 12 ft., horizontal or parallel to rake of steps.
2. Coat post ends to be set in grout with bituminous paint.
3. Grout posts in place as detailed with 1/8 in. buildup, sloped away from post and brace until grout sets.

3.02 PROTECTION

A. Protect finished surfaces against damage during subsequent construction operations and remove such protection at time of substantial completion.

B. Touch Up: Touch up marred and abraded surfaces with specified paint after erection in field.

- END OF SECTION -

SECTION 05510

METAL STAIRS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Drop-In.

B. Related Work:
   1. Section 09900, Painting.

1.02 QUALITY ASSURANCE

A. Design Criteria:
   1. Provide stairs and platforms to support min. 100 psi live load and 300 lb. concentrated load.
   2. Provide handrails and supports to withstand 200 lb. load applied at any point, downward and horizontally.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Shop Drawings.
   2. Assembly and erection drawings and manuals.
   3. Manufacturer's standard guarantee.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel: Refer to Section 05500, Metal Fabrications.

B. Fastener: Refer to Section 05500, Metal Fabrications.

C. Ferrous Metal Primer: SSPC Paint 2 or 3.

2.02 FABRICATION

A. Accessories:
   1. General:
      a. Provide stringers, risers, sub-treads, and platforms as detailed.
      b. Form tread pan and riser in continuous piece to receive finished tread except as otherwise indicated.
      c. Tread and Riser Style: Angle front return and coved riser for concrete fill.
      d. Stair Nosings: Fluted abrasive aggregate cast surface, iron, 5/16 in. thick x 6 in. width, 3/8 in. nosing lip.
   2. Weld or bolt risers and treads to carrier angles.

3. Weld or rivet carrier angles to structural steel stringers.
4. Fasten countersunk bolts or stud weld clips through pans and platforms to facilitate fastening of welded wire fabric for cement fill except for industrial open grating or diamond plate stairs.

B. Metal Bases:
1. Provide on intermediate landings formed from stringers of section and gage indicated.
2. Miter and weld internal and external corners of metal bases.

C. Railings: Refer to Section 05500, Metal Fabrications.

D. Shop Assembly and Finishing:
1. Countersink rivet and bolt heads and screws on finished surfaces.
2. Properly fit and securely fasten together all parts.
3. Make exposed joints close fitting.
4. Cut, drill, punch, and tap as required.
5. Welding:
   a. Comply with AWS D1.1.
   b. Make joints strong and rigid to match adjoining sections.
   c. Weld continuously along entire line of contact except where spot welding is indicated.
   d. Grind exposed welds flush and smooth.
6. Cleaning and Painting:
   a. Apply shop coat of inorganic zinc primer on ferrous metal surfaces.
   b. Thoroughly clean surfaces of loose scale, filings, and other materials before painting.
   c. Remove grease.
   d. Apply paint in dry weather or under cover.
   e. Do not deliver materials until shop coat has dried.

PART 3 EXECUTION

3.01 INSTALLATION

A. Metal Work:
1. Fasten metal work to solid work with expansion bolts except as indicated otherwise.
2. Thread screws full length to head of screw.
3. Provide connecting members needed for proper securing of work to masonry or structural framing.
4. Install Work plumb and true to exact lines and levels, in correct locations and in proper relation to adjoining work.
5. Leave work exposed to view, including stair soffits, clean, smooth, and neatly finished.

B. Miscellaneous Items:
1. Coordinate and schedule Work with Work of other

sections.

2. Furnish anchors, sockets, fastenings, and other items to be embedded in concrete or masonry.
3. Fill all pans on straight run stairs with concrete having min. 3000 psi compressive strength.

C. Touch up marred and abraded shop paint on exposed surfaces after erection.

D. Painting: Refer to Section 09900, Painting.

- END OF SECTION -

DIVISION 6

WOOD and PLASTIC

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Attention is directed to the printed form of Contract and of these specifications which are hereby made a part of this Section of the specifications.

1.02 SCOPE OF WORK

A. Provide all rough carpentry complete in place, as shown on the Drawings, specified here or required for a proper job.

B. Work specified in this Section includes, but is not limited to:

1. Furnish and install all rough carpentry work, including wood studs, soles, grounds, blocking, rough frames, sills, nailing strips, headers, strapping, joists, girts, miscellaneous framing members and wood mailers on steel beams.

2. Unless otherwise specified, rough hardware such as nails, screws, clips, and other devises required for securing items of rough carpentry shall be furnished and installed under this Section.

3. Plywood subfloors.

4. Wood Preservative treatment.

5. Joist hangers, beam connections, post caps,post bases and lag bolts shall be installed in this Section.

1.03 SUBMITTALS

A. In accordance with the general requirements of the Contract for submission of shop drawings and samples, submit the following:

1. Submittals:

a. Any rough hardware items required by the Architect.

2. Certifications:

a. Submit certification of preservative treatment stating chemicals used, process, net amount of salts retained, reference standards complied with, and moisture content to which materials were dried.

1.04 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Immediately upon delivery to the job site, place materials in a area protected from weather.

B. Store materials a minimum of 6 inches above ground on dunnage and cover with protective waterproof covering providing from adequate air circulation or ventilation.

C. Do not store seasoned materials in wet or damp portions of building.

D. Protect sheet materials from corner breakage and damage while unloading.

1.05 REFERENCES AND STANDARDS

A. The following references and standards are hereby made a part of this Section and work shall conform to the applicable requirements therein except as otherwise specified herein shall be construed as permitting work that is contrary to code requirements or governing rules and regulations.

1. Softwood plywood : U.S. Dept. of Commerce PP. 1.

2. Lumber: U.S. Dept. of Commerce PS. 20.

B. All lumber provided shall bear an official grade mark specifying the species or species grouping, grading agency, mill number or name condition of seasoning at the time of manufacture.

C. All pressure preservative treated limber shall bear, in addition to a grade mark, the mark of treating company certifying the type of treatment applied.

D. Softwood plywood panels shall bear the appropriate American Plywood Association grade mark indicating

type, grade and class of the panel.

E. Nailing:

1. Comply with Table 2103-2 of the Massachusetts State Building Code.

PART 2 PRODUCTS

2.01 FRAMING LUMBER

A. GENERAL

1. For solid lumber beams, joists, rafters, headers, stingers, plates and sills use Spruce-Pine-Fir #1 or Hem-Fir #2 with Fb (single use) = 1200 PSI, Fb (repetitive use) = 1300 PSI, E=1,400,000 PSI or better.

2. For studs use lumber chosen from the following:

SPECIES	GRADES
Eastern Hemlock Eastern Spruce Hem-Fir	Stud/#2

3. For caps, bucks, sleepers, bracing, nailers, etc., use of any of the above species graded Utility.

B. DIMENSIONS:

1. Specified dimensions are nominal and actual dimensions shall conform to industry standards.

C. MOISTURE CONTENT:

1. 19% max. for 2" or less nominal thickness except as noted below. If the framing lumber has been surfaced green or is not stamped "S-dry", the Contractor shall engage an independent testing agency to certify that the lumber is sufficiently seasoned to meet the minimum moisture content specified.

D. SURFACING:

1. Use S4S material (surface four sides) unless specified otherwise.

E. PRESSURE APPLIED PRESERVATIVE TREATMENT:

1. All lumber, exterior and interior, having direct contact with concrete and masonry and all blocking, nailing strips, curbs, wood battens and flashing, vapor barriers and waterproofing shall be given a pressure preservative treatment of either water-borne chromated copper arsenate meeting AWPA Standard P-5 and applied in conformance with American Wood Preservers Association Standards C-2 to a retention level of 0.25 lbs. per cubic foot; or liquified-petroleum-gas-borne pentacholorophenol meeting requirements of AWPA Standard P-8, Section 1 and applied in accordance with AWPA Standards C-2 to a retention level of 0.40 pounds per cubic foot.

2. Wood treated with pressure applied preservatives shall kiln dried to a maximum moisture content of 15% before delivery to the job site.

3. Treated products shall conform to the American Wood Preservers Bureau Standards LP-2 and be so stamped on each piece delivered.

2.02 PLYWOOD

A. Plywood roof sheathing shall be APA grade - trademarked C-D interior with exterior glue, 5/8" thick, and with an identification index of at least 42/20. Roof sheathing shall be tongue and grooved at the edges or 2 X 4 blocking shall be provided at plywood joints between rafters.

2.03 ROUGH HARDWARE

A. All rough hardware items for exterior use and to be exposed in the finished interior work shall be hot-dip galvanized or non-ferrous. Cadium plating may be substituted for galvanizing at interior locations only. Concealed interior nails may be bright.

1. Nails:

a. Common wire.

b. For plywood sheathing, use barbed plywood nails.

c. Use hot-dip galvanized nails for all exposed framing.

2. Bolts:

a. Standard mild steel, square or hexagonal head

matching nuts.

b. Cut washers as indicated.

3. Joist hangers:

a. 12 Gauge galvanized steel joist hangers shall be nailed according to manufacturer specifications.

B. Rough hardware items shall be of appropriate type and of proper capacity and size as required for each specific application.

C. Concrete and Masonry Anchors:

1. Where anchors are not included in the concrete or masonry construction, anchors shall be galvanized machine screws or bolts with standard expansion-shield;d type concrete anchors.

D. Powder-driven fasteners:

1. "Drive-it" system of the Powder Power Tool Corp., "Ramset" system of Ramset Fasteners, Inc., or the equivalent system of Remington-Dupont may be used where appropriate. Use washers with all inserts. If the use of powder-driven fasteners cause spalling of exposed concrete or other surfaces, concrete panels or other surfaces must be replaced with new panels or patched in manner wholey acceptable to the Architect.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. Before commencing work, check all lines and levels indicated and such other work as has been completed. Should there be any discrepancies, report same in writing to the Architect for correction or adjustment. In event of failure to do so, Contractor shall be responsible for correction of any errors.

3.02 INSTALLATION

A. GENERAL

1. Construct all rough carpentry work plumb, level and true, with tight, close fitting joints, securely attached and braced to surrounding construction all in first class workmanship manner.

2. Discard units of material with defects which might impair

the quality of the work.

3. Discard units which are too small to fabricate into the work and cause excessive joint arrangement.

4. Set carpentry work accurately to required levels and lines, with members plumb and true and accurately cut and fitted.

5. Securely attach carpentry work to substrate by anchoring and fastening as shown as required by recognized standards. Use common wire nails, except as otherwise indicated. Use cement-coated or screw nails for all plywood subflooring. Select fasteners of size that will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.

B. WOOD FRAMING

1. Provide wood framing members of sizes and of spacing shown, and frames openings as shown. Do not splice structural members between supports.

2. Anchor and nail as shown, and to comply with the best construction practice.

3. Firestop and conceal spaces with wood blocking not less than 2" thick, if not blocked away by other framing members.

C. STRUCTURAL MEMBERS

1. All lumber and timber used in load bearing members shall be sound, free from rot and large or loose knots, and damaging diagonal or spiral grain, and shall be at least equal in quality of the grades hereinafter specified. All lumber sizes herein specified are nominal sizes.

2. In girders, beams or joists, cuts and bore holes shall not be deeper than one-fifth (1/5) the diameter and shall not be located nearer to the end of the span than three (3) times the beam or girder depth nor within the the center third of the span unless reinforced to meet stress calculations. In studs of partitions, notches made to receive duct work or for other fabrications purposes shall not be more than one-third (1/3) the depth of the stud or the required studs shall be doubled or otherwise reinforced.

3. All structural members shall be connected and fastened at their junction with connectors, bolts, lag screws,

spikes, nails, straps, or other approved devices.

4. The ends of all beams or joists resting on girders or wall shall bear not less than four (4) inches or shall be supported in approved metal stirrups or on wood clips or ledger strips not less than two by three (2 X 3) inches in size. Beams or joists framing from opposite sides either lap not less than six (6) inches and shall be secured by bolted or spiked connections.

5. The joints of solid or built-up beams or girders shall be made over column or pier supports when constructed as simple spans. When constructed of multiple joists as continuous girders, members will be installed without joints.

6. All headers more than four (4) feet in length and their trimmers shall be doubled. Headers with four (4) or more tail beams of six (6) feet or more in length shall be supported on approved metal joists hangers. Tail and header beams shall be adequately secured by nailing.

7. Lintels over openings in partitions shall consists of multiple joists or other approved construction affording adequate strength.

D. WOOD BLOCKING AND NAILERS

1. Nailers for the wood trim and finish shall be provided and secured to the concrete, wood framing, or other received surfaces as the work progresses. The nailer shall be not be less than one (1) inch nominal thickness and of such other dimensions as is required.

E. PLYWOOD

1. Comply with the recommendations of the American Plywood Association (APA), for the installation of plywood.

F. WOOD TREATMENT - Refer to Section 2.01E

1. Treat wood sills, sleepers, blocking, furring, stripping, and all wood in contact with or within 12 inches of concrete or masonry shall be treated on all surfaces, including field cuts.

2. Treat wood framing members less than 12" above grade.

3. Treat wood nailers.

G. JOIST FRAMING

1. General:

   a. Provide framing of sizes and on spacing shown.

   b. Install with crown edge up and support ends of each member with not less than 3-1/2" of bearing on wood or metal.

   c. Attach to wood bearing members by toe nailing or metal connectors; frame to wood supporting members with metal connectors.

2. Headers and joist shall be connected by approved metal fittings, or securely spiked together.

3. Joist bearing on wood plates shall be toe nailed to the plates with one 10d nail on each side or fastened with suitable zinc-coated anchors made especially with such purpose.

4. Joists lapped over girders or bearing walls shall be nailed together with two 10d nails and toe nailed to girder to plate with one 10d nail on each side of the pair.

5. Provide briding between joists where nominal depth-to-thickness ratio exceeds 4, at intervals of 8'. Use solid wood bridging 2" thick by depth of joist, end nailed to joist.

END OF SECTION 06100

SECTION 06400

ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Standing and Running Trim.
   2. Countertops.
   3. Stairwork and Handrails.
   4. Door Frames.

B. Related Work:
   1. Section 06100, Rough Carpentry.
   2. Section 08210, Wood Doors.
   3. Section 09900, Painting.

1.02 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Provide millwork only from manufacturers complying with AWI Standards producing similar Work for min. 5 yrs.
   2. Installer: Employ only experienced personnel for fabrication and installation of millwork.

B. Design Criteria:
   1. Reference Standards:
      a. Refer to AWI Quality Standards for definition of Premium, Custom, or Economy.
      b. Any item not given specific quality grade shall be Custom Grade.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Shop Drawings:
      a. Submit shop drawings showing detail construction of woodwork, based on Drawings, and modified or revised as may be required to achieve intended structural character.
      b. Elevations: Draw at scale of min. 1/2 in. = 1 ft.
      c. Details: Draw at scale of min. 3 in. = 1 ft.
   2. Manufacturer's Data: Submit literature of specialty items not manufactured by millwork manufacturer.
   3. Samples:
      a. Submit min. 12 in. sq. or 12 in. length of each wood specie to receive transparent finish and factory finished items.
      b. Submit one sample of each item of hardware for review.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protection and Storage:
   1. Deliver woodwork fully protected from weather and damage.
   2. Store woodwork in weathertight, well ventilated area.
   3. Do not install woodwork in any space until plaster, masonry, and other wet work in space is sufficiently dry.

PART 2 PRODUCTS

2.01 MATERIALS

A. Solid Lumber Stock:
   1. General:
      a. Comply with AWI 100, plain sawn, S4S and work to shapes indicated, unless otherwise indicated.
      b. Exposed - Transparent Finish: Grade 1, red oak for hardwood, clear white pine or white wood for softwood.
      c. Exposed - Painted Finish: Grade II, birch for hardwood, white pine or white wood for softwood.
   2. Preservative Treatment - Exterior Woodwork: Refer to Section 06100, Rough Carpentry.

B. Plywood:
   1. Comply with AWI 200, veneer core.
   2. Face Veneer:
      a. Hardwood: Red oak.
      b. Softwood: Douglas fir.
   3. Cut: Plain sliced, smooth.

C. Particleboard:
   1. Comply with AWI 200 and CS236, mat formed.
   2. Density: Medium density, 37 to 50 lbs. per cu. ft.
   3. Surface Bearing Characteristics: ASTM E84-81a.
      a. Flame Spread: 25.
      b. Fuel Contributed: 10.
      c. Smoke Developed: 25.
   4. Finish:
      a. Paint or varnish all surfaces and edges not covered with plastic laminate.
      b. At cutouts made for particleboard countertops, seal all edges to prevent water damage or swelling of material.
   5. Acceptable Manufacturer: Duraflake Division Model Duraflake FR, Wilamette Industries, Inc.

D. Hardboard:
   1. Comply with AWI 200, Grade 1, tempered smooth two sides for both side exposure, smooth one side for one side concealed.
   2. 1/4 in. thick tempered for use as substitute for

1/4 in. plywood when surfaces are painted.

E. Plastic Laminate:
1. NEMA LD3 General Purpose Type 0.05 in. thick, finish and color as selected.
2. Backing sheets on shelves 0.02 in. thick.

F. Fasteners:
1. Wood Screws: ANSI B18, type, size, and material as required for condition of use.
2. Bolts and Nuts: ANSI B18 and ASTM A307-80 type, size, and material as required.

G. Adhesives: Melanine, phenol-resin, or seasoned-resin to AWI standards and manufacturer's recommendations suited for the purpose.

2.02 FABRICATION

A. Standing and Running Trim:
1. Interior Lumber:
   a. Transparent Finish: AWI 300, Premium Grade, using hardwood lumber.
   b. Opaque Finish: AWI 300, Custom Grade, using softwood lumber.
2. Interior Plywood:
   a. Transparent Finish: AWI 200, Grade I, using face veneer to match lumber.
   b. Opaque Finish: AWI 200, Grade II, using softwood face veneer.
3. Standing Trim: Items of fixed length to include but not be limited to:
   a. Stops.
   b. Stools or Sills.
   c. Apron.
4. Running Trim: Items of continuing length to include but not be limited to:
   a. Chair Rails.
   b. Base.
   c. Shoe Mouldings.

B. Countertops:
1. AWI 400C, Custom Grade for quality of fabrication.
2. Finish: Plastic laminate with solid hardwood bullnose.
3. Core: Particleboard.
4. Thickness: 1-1/8 in.

C. Stairwork and Handrails:
1. AWI 800, Premium Grade for treads, risers, face stringer, balusters, and railings.
2. Specie:
   a. Balusters: Red oak.
   b. Handrail: Red oak.
3. Concealed Lumber: No. 1 Structural Grade, refer to Section 06100, Rough Carpentry.
4. Finish: Carpeted for treads and risers.

D. Door Frames - Interior:
   1. AWI 900, Custom Grade for fabrication and material quality.
   2. Finish: As selected with lumber suited to finish selected.
   3. Refer to Section 08210, Wood Doors, for frame requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. Examine substrates and adjoining construction, and conditions under which Work will be installed.

B. Do not proceed with Work until conditions detrimental to proper and timely completion of Work have been corrected.

3.02 INSTALLATION

A. General:
   1. Verify dimensions before proceeding and obtain measurements at site for Work required to be accurately fitted to other construction.
   2. Coordinate Work with other trades affected by this installation.
   3. Give particular attention to work of supporting and attachment items so as not to delay progress.
   4. Backprime lumber for painted finish exposed on exterior, or in moisture or humidity locations on interior, to requirements of Section 09900, Painting.
   5. Discard material which is unsound, warped, bowed, twisted, improperly treated, too small to fabricate work with minimum joints, or of defective fabrication with respect to surface, size, or pattern.
   6. Scribe and cut work to fit adjoining work and refinish cut surfaces.

B. Standing and Running Trim:
   1. Install with minimum joints using full-length pieces.
   2. Stagger joints in adjacent and related members.
   3. Cope at returns and miter at corners.
   4. Use scaft joints for end-to-end joints.
   5. Apply flat grain lumber with back side exposed.
   6. Secure to grounds, stripping, and blocking with concealed and blind nails using fine finishing nails.

C. Finishes: Refer to Section 09900, Painting, for field furnished items.

3.03 FIELD QUALITY CONTROL

A. Tolerances:
   1. Plumb and Level: 1/8 in. in 8 ft.
   2. Offset in Surface Alignment: Max. 1/16 in.
   3. Offset in Revealed Adjoining Surface: Max. 1/8 in.

3.04 ADJUSTING AND CLEANING

A. Adjustments:
   1. Repair damaged Work or replace with new to eliminate defects.
   2. Adjust joinery for uniform appearance.
   3. Clean, lubricate, and adjust hardware.

B. Cleaning:
   1. Clean all surfaces.
   2. Provide protection and maintain installed condition until Substantial Completion.

- END OF SECTION -

SECTION 06700

WOOD RESTORATION AND CLEANING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Rebuild or replace damaged wood elements.
   2. Remove damaged and failing paint.
   3. Clean all wood surfaces before refinishing.

B. Related Work:
   1. Section 06100, Rough Carpentry.
   2. Section 09900, Painting.

1.02 QUALITY ASSURANCE

A. Qualifications:
   1. Applicator:
      a. Provide one person to supervise Work of this Section thoroughly familiar with manufacturer's recommended methods, materials, and nature of Work specified.
      b. No Contractor will be considered who has not demonstrated through previous experience ability to perform Work required of this Section.

B. Design Criteria:
   1. General: Paint surface conditions are grouped into three classifications according to relative severity.
   2. Class I Condition: Includes minor blemishes or dirt collection and requires no paint removal.
   3. Class II Condition: Includes failure of top layer or layers of paint and requires limited paint removal.
   4. Class III Condition: Includes substantial or multiple-layer failure and requires extensive or total paint removal.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Product Data: Complete list of chemicals and equipment scheduled for use in all three classifications of paint restoration cross-related to surface where used.
   2. Sample Panel:
      a. Provide sample areas 6 ft. x 6 ft. at designated location showing methods of cleaning for each classification.
      b. Obtain acceptance of sample panel from Owner and Architect before proceeding with Work on

remainder of building.

1.04 PROJECT CONDITIONS

A. Existing Conditions: Refer to Section 02070, Selective Demolition, for precautions regarding potential lead-based substances during paint removal and cleaning operations.

PART 2 PRODUCTS

2.01 MATERIALS

A. Chemical Paint Remover:
   1. Water-soluble, biodegradable specially thickened solution to disolve and remove oil-base and latex paints, varnishes, lacquers, and stains with either animal or vegetable oil-base.
   2. Coverage: Variable, 50 to 75 sq. ft. per gal.
   3. Acceptable Manufacturer: Deidrich Chemicals - Restoration Technologies Inc. Model 606 or 606X Paint Remover; American Building Restoration Chemicals, Inc. Model 800 Paint Remover.

B. Chemical Cleaner:
   1. Water-soluble, biodegradable detergent in clear aqueous liquid form to clean surfaces and neutralize paint remover.
   2. Coverage: Variable, 200 sq. ft. per gal.
   3. Acceptable Manufacturer: Deidrich Chemicals - Restoration Technologies Inc. Model 101; American Building Restoration Chemicals, Inc. Model 801.

C. Fungus Treatment:
   1. Liquid Preservative: Tributyltin-oxide (TBTO).
   2. Fumigant Preservative: Osmose Model Timber-Fume in Chemo Degradable vials.

D. Wood Epoxy:
   1. Consolidant: Abatron Inc. Model Liquid Wood.
   2. Filler/Adhesive: Abatron Inc. Model Wood Epox.

2.02 EQUIPMENT

A. Fluid Blasting Pump Unit:
   1. Pressure Rating: Adjustable, 500 to 2000 psi.
   2. Flow Rate: Max. 5 gal. per minute.
   3. Spray Tip or Nozzle: Min. 20 deg. fan.

PART 3 EXECUTION

3.01 APPLICATION

A. Class I Condition:
   1. General:
      a. Water Washing/Rinsing: Do not flood surface.
      b. Scrubbing: Use medium soft brush and non-

aggressive technique.

2. Environmental Grime or Organic Matter:
   a. Loosen by strong direct stream of water from nozzle of garden hose.
   b. Scrub stubborn dirt and soot using 1/2 cup of powdered household laundry detergent in 1 gal. water using medium soft brush.
   c. Rinse surface thoroughly and permit to dry before further inspecting to determine if repainting is necessary when paint color is not being changed.
3. Mildew:
   a. Use solution of 1 cup non-ammoniated detergent, 1 qt. household bleach, and 1 gal. water.
   b. Scrub surface with solution using medium soft brush.
   c. For stubborn spots use additional quart of bleach.
   d. Rinse surface thoroughly and permit to dry before further inspecting to determine if repainting is necessary when paint color is not being changed.
4. Chalking:
   a. Use solution of 1/2 cup non-ammoniated detergent and 1 gal. water.
   b. Scrub surface with solution using medium soft brush.
   c. Rinse surface thoroughly and permit to dry before further inspecting to determine if repainting is necessary when paint color is not being changed.
5. Staining:
   a. When staining is caused by nail head rusting; countersink, spot prime, and fill holes with high quality wood filler.
   b. Do not use proceeding method where nail head was part of original construction system or wood is too fragile to withstand countersinking method.
   c. Clean discolorations due to color extractives using solution of equal parts denatured alcohol and water, rinse, allow to dry, and apply stain-blocking primer.

B. Class II Condition:
1. Crazing:
   a. Hand or mechanical sand surface to smooth surface.
   b. For deep cracking or alligatoring follow Class III Condition methods.
2. Intercoat Peeling:
   a. Wash affected area thoroughly after scraping and wipe dry.
   b. Hand or mechanical sand surface to next sound layer.
3. Solvent Blistering: Hand or mechanically sand surface to next sound layer.

4. Wrinkling:
    a. Scrape wrinkled layer.
    b. Hand or mechanically sand surface.

C. Class III Condition:
1. General:
    a. Allow wood to thoroughly dry out before correcting surface conditions.
    b. Correct and repair any damaged areas.
2. Use manual and mechanical abrasive methods first.
3. Use chemical paint removal for total paint removal where designated.

D. Manual Abrasive Method:
1. Scrape surface using putty knife, paint scraper, or both.
2. Use putty knife in pushing motion going under paint working from area of loose paint toward edge where paint is still firmly attached, in effect beveling remaining layers for smooth transition between damaged and undamaged areas.

E. Mechanical Abrasive Method:
1. Use orbital or belt sanders only.
2. Do not use rotary drill attachments, water-blasting, or sand-blasting.
3. Use orbital sanders for feathering areas where paint has been scraped first.
4. Limit use of belt sander to flat surfaces operated only by skilled operators.
5. Use with care to prevent damage to fragile wood.

E. Chemical Methods:
1. Comply with manufacturer's instructions.
2. Apply chemical solution using brush or roller or by dipping removable items.
3. Avoid penetration or grain raising and remove sludge as soon as paint has been loosened.
4. Collect sludge in containers, label containers, and dispose of containers at approved site.
5. Rinse surface with water immediately until all traces of dissolved paint is removed.
6. Follow rinsing with neutralizing mixture.
7. Allow surface to thoroughly dry before repainting.
8. Alternate Procedure:
    a. Where two separate applications are required, alternate procedure may be used at discretion and responsibility of applicator.
    b. Apply chemical stripper.
    c. Maintain wet using fine mist of water to prolong chemical activity.
    d. Remove using high pressure washer to remove paint and chemical stripper.
    e. Take care to prevent damage to wood surface when using high pressure washer.
    f. Remove remainder of paint using disk sanders.

F. Repairs:
   1. Decay Voids:
      a. Drill holes or enclose affected area and treat with liquid preservative to effect contact kill of fungus.
      b. Insert fumigant preservative in inspection holes and seal using preservative-treated wooden plugs.
      c. Seal with plywood forms and paste-type epoxy sealer to close off openings and large voids.
      d. Install injection ports in inspection holes.
      e. After sealer has cured min. 12 hrs., inject under controlled pressure low viscosity epoxy having consistency of water to fill remaining voids.
   2. Damaged Wood Shapes:
      a. Build-up missing contours using filler/adhesive.
      b. Hand form to shape before initial set.
      c. Form to final shape by sawing, planning, filing, or carving after final set.
      d. Finish to match wood shape.
   3. Structural Elements:
      a. Shore up area and maintain supports during repair operations.
      b. Remove length of damaged element to nearest supports.
      c. Replace with new wood to match removed element to requirements of Section 06100, Rough Carpentry.

G. Painting:
   1. Comply with Section 09900, Painting.
   2. For areas prone to mildew, use mildew-resistant primer.
   3. For areas prone to staining, use stain-blocking primer applied in two coats, with each coat allowed to dry min. 40 hrs.

3.02 CLEANING

A. Remove all debris and dispose of in approved manner.

B. Remove all paint spots, oils, or stains on adjacent surfaces and areas.

C. Leave entire job clean.

- END OF SECTION -

DIVISION 7

THERMAL and MOISTURE PROTECTION

SECTION 07100

WATERPROOFING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Cementitious Waterproofing.
   2. Latex Membrane and Neoprene - Cement Surfacing.
   3. Protectin Board.

1.02 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Min. 10 yrs. experience in type of system specified.
   2. Applicator: Min. 5 yrs. experience and having manufacturer's certification of acceptability for installation.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Manufacturer's Review:
      a. Before delivering materials to Project site, submit statement signed by Contractor and installer indicating method specified has been reviewed with manufacturer.
      b. Provide statement that manufacturer is in agreement with selected method and materials for the application.
      c. Provide by transmittal that manufacturer has received a copy of statement.
   2. Manufacturer's Data.
   3. Shop Drawings: Indicate edge terminations and flashing details referencing each material, sequence, and application process.
   4. Certification: Executed by manufacturer for Project indicating acceptability of condition for use, license certificate for applicator issued by manufacturer.

1.04 DELIVERY, STORAGE, AND PROTECTION

A. Deliver materials in manufacturer's unopened containers or bundles fully identified with brand, type, grade, class, and all other qualifiying information.

B. Protection:
   1. Protect building from damage resulting from spillage, dripping, and dropping of materials.
   2. Prevent waterproofing materials from entering and clogging drains and water conductors.

3. Repair and restore or replace other Work which is soiled or damaged in connection with performance of waterproofing Work.
4. Inspect Work and record in writing, deterioration or damage of surfaces before placing fill or wearing surfaces.

1.05 PROJECT CONDITIONS

A. Environmental Requirements:
1. Do not proceed with waterproofing Work during inclement weather.
2. Concrete Substrate: Cured and free of all moisture detrimental to placing waterproofing.
3. Drying required due to wetting of substrate by inclement weather and/or adjacent wet construction to manufacturer's recommendations.
4. Placing of waterproofing shall constitute acceptance of substrate conditions by installer.
5. Apply at temperatures of 40 deg. F. and above; do not apply to frozen surfaces.

B. Scheduling: Before installation of waterproofing review material selections, installation procedures, and coordination of Work with other trades.

1.06 WARRANTY

A. Submit for materials and application, jointly signed by applicator and manufacturer indicating materials and application shall resist water for min. 2 yr. period.

B. Warranty shall include removal and replacement of all work related to repair or replacement of waterproofing.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cementitious Waterproofing:
1. Composition: Prepackaged, dry, nonflammable and nontoxic waterproof cement.
2. Compressive Strength: ASTM C109-80, mon. 6,000 psi.
3. Color: Cement gray or white.
4. Acceptable Manufacturer: Thoro System Products, U.S. Waterproofing Inc., Anti-Hydro Waterproofing, Permaquik, Inc.

B. Latex Membrane and Neoprene - Cement Surfacing:
1. Multi-layer trowele applied waterproofing with wear-resistant layer.
2. Thickness: 3/16 in. to 1/4 in.
3. Weight: 2.5 lb. per sq. ft.
4. Fire Resistance: ASTM E108-83, Method C - Class A.
5. Acceptable Manufacturer: Crossfield Products Corp. Model Dex-O-Tex Weatherproof Promenade Roof Deck

Covering.

C. Protection Board:
   1. Description: ASTM C578-83, extruded polystyrene foam insulation.
   2. Fire Resistance: ASTM E84-81a to following standards:
      a. Flame Spread: 0 - 25.
      b. Fuel Contributed: 0.
      c. Smoke Developed: 0 - 160.
   3. Density: 1.6 - 3.
   4. Water Vapor Premeance: ASTM E96-80, max. 1.0 perm.
   5. Thermal Resistance: R-value = 4 - 6 @ 1 in.
   6. Acceptable Manufacturer: Dow Chemical U.S.A. Model Styrofoam TG, UC Industries Model Foamular 250 TG.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect all surfaces to receive waterproofing and verify:
   1. Surfaces are free of dirt, grease, oil, curing compounds, form release agents, paints, impregnations, all loose material, and foreign matter likely to affect bond or performance of waterproofing.
   2. Provisions for expansion and control joints are consistent with Specifications and Drawings.
   3. Set Concrete Surfaces:
      a. Surfaces are sufficiently rough to ensure good cement bond.
      b. Finish similar to medium sandpaper or rougher is recommended.
      c. Surfaces/substrates have completed min. 14 day curing period, are structurally sound, and all cracks have been repaired.

3.02 PREPARATION

A. Cleaning and Roughening: Mechanically or chemically clean and roughen surfaces by waterblasting, sandblasting, chipping, brushing, acid-etching, or using approved chemical detergent.

B. Repairing Cracks, Spalled Areas, and Patching Holes:
   1. Rout cracks not subject to movement exceeding 1/10 in. width to min. depth of 1 in. and patch with waterproofing.
   2. Treat all cracks subject to movement as indicated in Specifications and on Drawings.
   3. Seal all cracks and active leaks with waterproof plug.
   4. Patch honeycombed or spalled concrete areas and holes with waterproofing.

C. Surface Wetdown:
   1. Wet all surfaces thoroughly saturated moist and

remove all freestanding and excess water before applying waterproofing.

3.03 INSTALLATION

A. Surface/System Application:
   1. Foundation Walls Below Grade: Cementitious waterproofing with protection board, applied to exterior of foundation walls.
   2. Balconies: Latex membrane and surfacing.

B. Cementitious Application:
   1. Mix materials to consistency recommended by manufacturer.
   2. Thoroughly mix waterproofing using mortar mixer or electric drill mixer, leaving no lumps or unmixed materials.
   3. Add water to achieve desired consistency, not excluding manufacturer's recommendations.
   4. Apply in one coat, min. 1/8 in. thick, to completely fill voids, holes, cracks, leaving no pinholes or uncovered areas.
   5. Curing:
      a. Protect from excessive evaporation during hot or windy conditions by moist curing for first 4 hrs. or by applying approved curing compound.
      b. For maximum wear resistance cover with polyethylene immediately after hardening.

C. Latex Membrane and Surfacing:
   1. Apply slip sheet recommended by manufacturer on substrate.
   2. Apply latex fabric reinforced membrane on slip sheet.
   3. Continue membrane up vertical face of curbs at perimeter of deck.
   4. Trowel apply surfacing to required thickness to totally cover membrane.

D. Protection Board:
   1. Stagger end joint locations in single layer installation.
   2. Coat edges of insulation boards with adhesive at joints when insulation system is set in adhesive.
   3. Shove boards into place so that compound seals joints.
   4. Apply vapor barrier tape to all seams, joints, penetrations, and terminations where shown to receive vapor barrier facing to achieve full integrity of vapor barrier.
   5. Foundations:
      a. Extend around entire perimeter underslab of conditioned spaces to 24 in. from foundation wall.
      b. Extend down foundation wall to footings on inside of foundation wall around entire perimeter of conditioned spaces.

- END OF SECTION -

SECTION 07200

INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Rigid Board Insulation.
   2. Fibrous Batt or Blanket Insulation
   3. Sound Insulation.

B. Related Work:
   1. Section 04200, Unit Masonry.
   2. Section 09250, Gypsum Board.

1.02 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Manufacturer's Data.
   2. Installation Instructions.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Protection:
   1. Protect insulation materials from weather and construction processes.
   2. Do not allow insulation to become wet or soiled.
   3. Comply with precautions and recommendations of manufacturer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rigid Board - Foamed Polystyrene:
   1. Description: ASTM G578-83, closed-cell expanded polystyrene (ESP) foam board for wall and perimeter applications.
   2. Fire Resistance: ASTM E84-81a to following standards:
      a. Flame Spread: 0 - 25.
      b. Fuel Contributed: 0.
      c. Smoke Developed: 0 - 160.
   3. Density: 1 - 2 lbs. per cu. ft.
   4. Thermal Resistance: R-value = 3.8 - 5 @ 1 in.
   5. Acceptable Manufacturers: Manufacturers of Society of the Plastics Industry Expandable Polystyrene Materials Group, Associated Foam Mfg.

B. Fibrous - Batt or Blanket Glass Fiber:
   1. Description: ASTM C665-84, glass fiber blanket thermal and acoustical insulation.
   2. Fire Resistance: ASTM E84-81a to following stand-

ards:
a. Flame Spread: 0 - 25.
b. Fuel Contributed: 0 - 50.
c. Smoke Developed: 0 - 50.
3. Density: 0.50 - 4 lbs. per cu. ft.
4. Thermal Resistance: R-value = 3.16 @ 1 in.
5. Acoustical Performance: NRC of 0.50 @ 1 in.
6. Acceptable Manufacturer: Owens Corning Fiberglas Corp., Certainteed Corp., Manville.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:
1. Extend insulation full thickness over entire area to be covered unless indicated otherwise.
2. Cut and fit insulation, where required, tightly around all obstructions so no voids exist in insulation course.
3. Comply with manufacturer's instructions for particular condition of use and type of insulation and accessory items.
4. Consult manufacturer's representative for specific instructions if instructions are not applicable to conditions of use.
5. Location Schedule:
a. Rigid Board - Expanded Polystyrene: Masonry wall cavities.
b. Fibrous: Ceilings and walls.

B. Rigid Board:
1. Stagger end joint locations in single layer installation.
2. Coat edges of insulation boards with adhesive at joints when insulation system is set in adhesive.
3. Shove boards into place so that compound seals joints.
4. Apply vapor barrier tape to all seams, joints, penetrations, and terminations where shown to receive vapor barrier facing to achieve full integrity of vapor barrier.

C. Batt or Blanket:
1. Non-Flanged Blankets - Metal Studs:
a. Install between studs from interior side of wall.
b. Attach to gypsum sheathing using 9/16 in. staples with divergent points placed at each corner and in center of each blanket.
c. Provide separate 6 mil polyethylene vapor barrier.
2. Vapor Barrier:
a. Seal to other surfaces by lapping with adhesive or taping to form continuous barrier.
b. Lap edges min. 4 in. for complete coverage.
c. Repair punctures and tears with adhesive

applied barrier material of self-adhesive barrier tape.

- END OF SECTION -

SECTION 07310

SHINGLES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Shingles.
   2. Underlayment.
   3. Fasteners.

B. Related Work:
   1. Section 07700, Roof Specialties and Accessories.

1.02 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Manufacturer's data.
   2. Samples: For selection of color and texture.
   3. Certification.

PART 2 PRODUCTS

2.01 MATERIALS

A. Shingles - Fiberglass:
   1. Description: ASTM D3018-82, Type 1 fiberglass mat shingles with asphalt, mineral stabilizers, ceramic granules, UL Class A and Wind Resistant Label, 3-tab self-sealing square tab design.
   2. Strips Per Square: 80.
   3. Bundles Per Square: 3.
   4. Exposure: Nom. 5 in.
   5. Size: Nom. 12 in. x 36 in.
   6. Headlap: 2 in.
   7. Color: As selected from manufacturer's standard.
   8. Acceptable Manufacturer: Celotex Model Fiber Glass Asphalt Shingles/25.

B. Underlayment:
   1. Application: Lay either two layers of No. 15 or one layer of No. 30 asphalt felt.
   2. No. 15 Asphalt Felt:
      a. UL 55A, Type 15, plain.
      b. Size: 36 in. wide x 72 in., 108 in., or 144 in. as required to cover roof length with no splices where possible.
   3. No. 30 Asphalt Felt:
      a. UL 55A, Type 30, plain.
      b. Size: 36 in. x 72 in.

C. Fasteners: Hot-dipped galvanized steel, 10-1/2 to 12 ga. roofing nails having 3/8 in. dia. heads, min.

1-1/4 in. long.

D. Cement: ASTM D2822-75, fibrated asphalt cement.

PART 3 EXECUTION

3.01 INSTALLATION

A. Underlayment:
   1. Comply with recommended specifications of ARMA.
   2. Lap each sheet 2 in. over preceeding sheet and turn up vertical surface 4 in.

B. Flashings:
   1. Eaves: Install troweling of plastic asphalt roofing cement at rate of 2 gal. per 100 sq. ft. over underlayment from eaves to point 12 in. inside wall line and lay additional felt over cemented area.
   2. Valley: Install metal flashing of material as specified in Section 07700, Roof Specialties and Accessories, with open valleys min. 5 in. wide at top and increasing 1/8 in. in width per foot of length.
   3. Side Wall: Fold from 10 in. wide material with standing 6 in. high leg and flat 4 in. under shingle.

C. Shingles:
   1. Apply with max. 5 in. weather exposure and min. 4 nails per strip.
   2. Set shingles at eaves and gable ends in solid coating of plastic cement 8 in. from all edges.
   3. Apply hip and ridge shingles to match field shingles.

- END OF SECTION -

SECTION 07500

MEMBRANE ROOFING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Elastic Membrane - EPDM.
   2. Roofing Ballast.
   3. Insulation.
   4. Fasteners and Edging.

B. Related Work:
   1. Section 07700, Roof Specialties and Accessories.
   2. Division 15, Mechanical.

1.02 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Min. 5 years successful experience in actual application of system with no defects or leakage related to materials, inspector for final approval of system.
   2. Installer: Min. 5 years experience in type of system specified and having manufacturer's certificate of acceptability for installation.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Submittals, Shop Drawings, Product Data, and Samples.
   1. Shop Drawings: Submit drawings of all edge terminations, piping support, and flashing details referencing each material, sequence, and application procedure.
   2. Manufacturer's Data: Printed specifications and installation instructions, vapor barrier installation and specification, listing of min. 5 projects of similar nature by both manufacturer and applicator within past 5 yrs.
   3. Certificate: On completion of Work, submit written statement signed by manufacturer's representative stating proper installation of materials.
   4. Maintenance: Submit detailed maintenance program developed by manufacturer.
   5. Sample: Min. 12 in. x 12 in. field sample from each roll of membrane before application.

1.04 WARRANTY

A. Provide Roofing Guarantee stating following:
   1. Roofing System installed shall be waterproof and free of defects for min. 10 yrs. from date of final acceptance.

2. Surface dressing component will present no visible signs of deterioration or discoloration for min. 5 yrs. from date of final acceptance.
3. No other component of roofing system will present any visible signs of deterioration for min. 10 yrs. from date of final acceptance.
4. In event any of above occur within respective periods stipulated, make all repairs and replacements necessary to remedy such defects at no additional cost and at convenience of Owner.

B. General Requirements:
1. Contractor Responsibility:
a. Certified by manufacturer of roofing materials.
b. Obtain authorization from roofing materials manufacturer for Project before installation starts to insure issuance of guarantee from manufacturer.
2. Manufacturer Responsibility:
a. Pay all authorized costs of repair of roofing membrane necessary to stop leaks.
b. Provide guarantee for specified number of years.
c. Issue guarantee within 6 months after completion of roofing system.
3. Owner Responsibility:
a. In event of leak in roofing membrane or flashing system, notify manufacturer in writing within thirty days after discovery of leak.
b. Notify manufacturer of any proposed modification, major repair, or addition on or through roofing or flashing for each situation occurring after date of issue of guarantee.
c. Provide manufacturer with drawings indicating location of proposed changes.

PART 2 PRODUCTS

2.01 MATERIALS

A. Roofing:
1. Elastic Sheet Membrane: 45 mil, black, calendered EPDM sheeting.
2. Physical Properties:
a. Tensile Strength: ASTM D412-80, min. 1305 psi.
b. Elongation: ASTM D412-80, 350 percent.
c. Tear Resistance: ASTM D624-81, 175 lb. per in.
d. Water Vapor Permeability: ASTM E96-80, Proc. C, max. 2.0 perms-mils.
e. Brittleness Temperature: ASTM D746-79, max. -75 deg. F.
3. Acceptable Manufacturer: Carlisle SynTec Systems Model Sure-Seal, Firestone Model Rubber Gard, Goodyear Model Versi-Gard.

B. Accessories:
1. Flashing: 60 mil incurred EPDM.

2. Adhesive: Bonding and splice, contact bond type.
3. Sealant.
4. Ballast: 3/4 in. to 1-1/2 in. washed river stone.
5. Insulation:
    a. Description: ASTM C591-69, polyisocyanurate.
    b. Fire Resistance: ASTM E84-81a to following standards: Flame Spread - 0 - 25, Smoke Developed - 0 - 60.
    c. Density: 2 - 3 lbs. per cu. ft.
    d. Thermal Resistance: R-value = 7.1 - 7.7 @ 1 in.

C. Flashing: Refer to Section 07700, Roof Specialties and Accessories, for fabricated metal flashing.

D. Sealant: Refer to Section 07900, Joint Sealers for silicone rubber sealant.

PART 3 EXECUTION

3.01 PREPARATION

A. Examine substrates, adjoining construction, and conditions governing installation of roofing system.

B. Clean substrate to remove debris and deleterious materials which would impair Work.

C. Do not proceed with installation until vents, drains, curbs, and other projections through roof deck have been installed.

3.02 INSTALLATION

A. General:
1. Complete Work to assure no water leakage occurring in system, to satisfy requirements specified in Part 1 of this Section.
2. Provide services of manufacturer's technical representative to advise on all phases of this Work at start of installation and continuously as Work progresses.
3. Roofing Membrane System: Universal Design B over existing roofing membrane.

B. Insulation:
1. Stagger joints both directions in multiple layered installation unless indicated otherwise.
2. Stagger end joint locations in single layer installation.
3. Coat edges of insulation boards with adhesive at joints when insulation system is set in adhesive.
4. Shove boards into place so that compound seals joints.
5. Apply vapor barrier tape to all seams, joints, penetrations, and terminations where shown to receive vapor barrier facing to achieve full in-

tegrity of vapor barrier.

6. Tapered Roof Systems:
   a. Slope: As detailed on Drawings.
   b. Concrete Decks: Solid mop primed deck with dead level asphalt at 25 lbs. per 100 sq. ft; allow to cool to 225 to 250 deg. F., and embed insulation by walking in.
   c. Nailable Decks: Solid mop with dead level asphalt at 43 lbs. per 100 sq. ft; allow to cool to 225 to 250 deg. F., and embed insulation by walking in.
   d. Laminate multi-layers of insulation using dead level asphalt which has cooled to 175 to 200 deg. F. before using; sprinkle mop at 10 to 15 lbs. per 100 sq. ft., and embed second insulation layer with joints staggered min. 6 in. from first layer in both directions.
7. Joints: Max. 1/4 in. wide.
8. Fasteners: Min. 2 per piece of insulation complete with plates.

C. Membrane:
1. Unroll, position and secure as detailed and as recommended by manufacturer.
2. Do not stretch membrane during installation.
3. Overlap sheets min. 2 in. to allow lap joint.
4. Apply adhesive full width of lap joint in continuous length.
5. Apply lap sealant after joint is set.
6. Secure membrane to roof deck at perimeter, large penetrations, and expansion joints with fasteners max. 12 in. o.c.

D. Flashing:
1. Extend min. 8 in. above membrane using 0.060 in. uncured EPDM.
2. Use splice adhesives to attach to metal flashing.
3. Work flashing into place on vertical substrate taking care to avoid entrapped air.
4. Hand roll using 2 in. metal roller for proper adhesion.

E. Ballast:
1. Secure all areas of installed membrane at end of each working day using temporary and permanent ballast.
2. Roof Above Elevation 77 ft.-3 in.: Use ASTM Grade 2 full coverage meeting FM I-28, 14 lb. per sq. ft.
3. Roof Below Elevation 77 ft.-3 in: Use full coverage meeting FM I-20.
4. Insulation:
   a. Comply with manufacturer's specifications for precautions.
   b. ESP: Min. 2 in. thickness.
   c. Perlite: 1-1/2 in. thickness.

F. Walk Boards: Apply as indicated.

3.03 ADJUSTING AND CLEANING

A. Progress Cleaning:
   1. Remove debris, empty containers, excess roofing materials, and other wastes from roof and dispose at end of each day.
   2. On roofing installaton completion, clean adjacent surfaces contaminated by roofing materials.
   3. Unplug and unmask protected openings and surfaces.

B. Exercise necessary precautions to avoid potential leaks on adjacent roof surfaces.

- END OF SECTION -

SECTION 07700

ROOF SPECIALTIES AND ACCESSORIES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Fabricated Flashing and Sheet Metal.
   2. Manufactured Roof Specialties.
   3. Firevent Skylight.

B. Related Work:
   1. Section 04200, Unit Masonry.
   2. Section 07310, Shingles.
   3. Section 07500, Membrane Roofing.
   4. Section 07900, Joint Sealers.

1.02 QUALITY ASSURANCE

A. Design Criteria:
   1. Firevent Skylight:
      a. Provide units which have been tested, listed, and labeled for construction and operation by UL.
      b. Lid Fire Resistance: UL Class A.

B. Reference Standards:
   1. SMACNA, Architectural Sheet Metal Manual.
   2. NRCA, Roofing and Waterproofing Manual.

1.02 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Product Data: Submit manufacturer's technical product data, rough-in diagrams, details, installation instructions, and general product recommendations for all items.
   2. Shop Drawings: Submit for fabricated items indicating layout, joining, profiles, accessories, anchorages, flashing connections, and relationship to supporting structure and adjoining roof and wall construction.
   3. Samples:
      a. Submit for items exposed to view in completed installation, complete with finishes for review and acceptance by Architect.
      b. Submit 8 in. sq. of sheet materials with finishes.
      c. Submit 24 in. length of extruded materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. Metals:
   1. Aluminum:
      a. Sheet: ASTM B209-81, 3003-H14, clear anodized finish, except as otherwise indicated.
      b. Extrusions: 6063-T52, clear anodized finish, min. 0.080 in. thickness.

B. Fasteners:
   1. Use fasteners of type and size suited for location and substrate.
   2. Aluminum: Use stainless steel or aluminum alloy.

C. Accessories:
   1. Roofing Felt: Asphalt saturated, 15 lb. unperforated type.
   2. Building Paper: Rosin sized, unsaturated, 6 lb. per 100 sq. ft.
   3. Sealants: Refer to Section 07900, Joint Sealers.

2.02 FABRICATION

A. Fabricated Flashing and Sheet Metal:
   1. General:
      a. Comply with SMACNA Architectural Sheet Metal Manual and Drawings for size, location, and fabrication of items.
      b. Material: Aluminum.
   2. Forming:
      a. Accurately reproduce profiles and bends.
      b. Make intersections sharp, even, and true.
      c. Make plain surfaces free from buckles and waves with minimal joints.
      d. Reinforce Work as required for strength and appearance.
      e. Bend to minimum radius recommended by manufacturer with radius not less than metal thickness.

B. Prefabricated Roof Specialties:
   1. General: Refer to Drawings for size, profile, and location of items.
   2. Copings:
      a. Two-part press-locking composite with concealed fasteners, raised edge sloping away from front edge of wall, and compression cleat or pad spaced to manufacturer's recommendations.
      b. Material: 0.050 in. aluminum.
      c. Acceptable Manufacturer: Standard Metal Products Model Press-Lock Coping, Construction Specialties Model Snap-Lock Coping.
   3. Cap Flashing:
      a. One-piece formed for snug fit using spring tension, surface mounted for concrete and saw joint for masonry for reroofing.
      b. Material: 0.050 in. aluminum.
      c. Acceptable Manufacturer: Standard Metal Prod-

ucts Model CFC-2 for concrete, CFW-2 for masonry.

4. Gutters and Downspouts - Metal:
   a. Material: 3105-H14 aluminum, 0.027 in. ga. for gutters and 0.019 in. ga. for downspouts.
   b. Provide gutters complete with strainers, outlet tubes, gutter ends, expansion joints, screens, and baffles.
   c. Provide rectangular corrugated downspouts complete with elbows.
   d. Color: White.
   e. Acceptable Manufacturer: Standard Metal Products, Modern Materials Corp., Hunter Douglas, Hastings Aluminum Products.

C. Firevent:
1. Type: Single leaf type with aluminum frame and curb.
2. Dome: Two-piece acrylic white transluscent.
3. Dome Frame: 6063-T5 extruded aluminum 0.080 in. thick, self-contained sloping condensation and weepage gutter.
4. Retaining Frame and Curb:
   a. 6063-T5 extruded aluminum, self-flashing.
   b. Rating: 2 hr.
   c. Provide integral aluminum cap flashing of same gage as frame, fully welded at corners, weathertight.
   d. Insulation: 1/2 in. rigid fiberboard between double skin aluminum.
   e. Provide perimeter weatherstripping.
   f. Provide complete with integral counterflashings and flanges on support curb for roof anchorage.
5. Hardware: Safety stops, heavy duty aluminum pivot hinges, chrome torsion springs and lifting arms, control and electrically operated release activator with interlock to smoke detector specified in Division 16, Electrical.
6. Opening: As detailed.
7. Acceptable Manufacturer: Wasco Products, Pam Co., Boehm MFg. Co.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:
1. Comply with SMACNA requirements unless indicated otherwise.
2. Refer to Section 07900, Joint Sealers, for sealant installation.
3. Do not proceed with Work until curb and substrate construction is completed.

B. Application:
1. Make joints tight.
2. Conceal nails and fasteners where possible.

3. Do not use face nailing on exposed surfaces.
4. Secure exposed edges to underlying materials using clips or tabs-edge strips.
5. Make seams in direction of water flow.
6. Hem exposed edges 1/2 in.
7. Perform cutting, fitting, punching for related work and provide necessary accessories.

C. Flashings:
1. Install to provide watertight protection as detailed.
2. Use base and counter type or cap type unless indicated otherwise.
3. Extend min. 4 in. around corners.
4. Nail max. 3 in. o.c. unless clips or cleats are used.
5. Make continuous straight runs in max. 24 ft. length except where manufacturer has more stringent requirements.
6. Expansion Joints:
   a. 3 in. loose lock, sealed watertight with sealant.
   b. Max. 10 ft. from any external or internal corner.
   c. Max. 34 ft., min. 10 ft. on straight runs, centered.
   d. Lock and lap and rivet running joints.

D. Gutters and Downspouts - Metal:
1. Use slip joint connectors to connect gutter sections, end joints, or miter corners together.
2. Fill joints with sealant and connect together.
3. Apply bead of sealant inside gutter along edge of connector.
4. Attach gutter sections to building using spike and ferrule every other rafter, on each side of any miter course, and two on each end section.
5. Drill holes for pop rivets in end cap and gutter section and bed end cap in sealant before pop riveting.
6. Connect downspout and elbows to gutter using pop rivets.
7. Make all connections in direction of water flow.
8. Fasten downspout to wall with hangers, min. 2 per length of downspout.
9. Install drip edge under shingles to prevent water reaching roof.
10. Wash system with detergent and touch up scratches and chips.

E. Separate dissimilar metals by painting with SSPC Paint 12 bituminous mastic or by using bitumen saturated and coated felt.

F. Specific Items: Refer to SMACNA Architectural Sheet Metal Specifications and comply with details indicated on Drawings.

3.02 CLEANING AND PROTECTION

A. Clean exposed surfaces to manufacturer's recommendations.

B. Provide protection to insure Work remains undamaged until time of Substantial Completion.

- END OF SECTION -

SECTION 07900

JOINT SEALERS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Sealants.
   2. Joint Filler Materials.
   3. Miscellaneous Materials.

B. Related Work:
   1. Section 04200, Unit Masonry.
   2. Section 07700, Roof Specialties and Accessories.
   3. Section 08100, Metal Doors and Frames.
   4. Section 08400, Entrances and Storefronts.
   5. Section 08520, Aluminum Windows.
   6. Section 08800, Glazing.
   7. Division 15, Mechanical.

1.02 QUALITY ASSURANCE

A. Qualifications:
   1. Before installation of sealants, and at Contractor's direction, meet at Project site to review material selections, joint preparations, installation procedures, and work sequencing.
   2. Examine sample application to determine and record whether all parties agree proposed installations are likely to perform as required.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Manufacturer's Data:
      a. Published data or manufacturer's letter, clearly indicating that each product to be furnished complies with specifications, recommended for application shown, and compatible with each other material in joint system.
      b. Complete instructions for handling, storage, mixing, priming, installation, curing, and protection of each type of compound and sealant.
   2. Sample:
      a. Submit for each type of exposed sealant compound, except those required to be black.
      b. Provide 12 in. length installed between two samples of materials to be sealed, fully cured.
      c. Samples will be reviewed for texture and color by Architect.

PART 2 PRODUCTS

2.01 MATERIALS

A. Bulk Compounds:
   1. General: Use self-leveling compounds for horizontal joints and non-sag compounds for all other areas except as indicated or specified.
   2. Sealant Color:
      a. Concealed Joints: Use sealant with manufacturer's standard color having best overall performance qualities for indicated application.
      b. Exposed Joints: Use sealant as selected from manufacturer's standard colors unless special colors are shown or specified.

B. Type A:
   1. Description: FS TT-S-00230C, Type II, Class A one-part non-sag polysulfide base synthetic rubber sealant compound.
   2. Joint Movement Range: 25 to 40 percent.
   3. Service Life: 10 to 20 years.
   4. Ultimate Tensile Strength: 85 to 120 psi.
   5. Shore A Hardness: 30 to 35 @ 75 deg. F. and 50 percent rh.
   6. Color: As selected.
   7. Acceptable Manufacturers: Pecora Corp., Thoro System Products, Thiokol/Specialty Chemicals Division, Sonneborn.

C. Type B:
   1. Description: FS TT-S-00227E, Type II, Class B two-part non-sag polysulfide base synthetic rubber sealant compound.
   2. Joint Movement Range: 25 to 50 percent.
   3. Service Life: 10 to 20 years.
   4. Ultimate Tensile Strength: 120 to 770 psi.
   5. Shore A Hardness: 15 to 50 @ 75 deg. F. and 50 percent rh.
   6. Color: As selected.
   7. Acceptable Manufacturers: Pecora Corp., Thoro System Products, Thiokol/Specialty Chemicals Division, Sonneborn, W.R. Meadows.

D. Type C:
   1. Description: FS TT-S-00230C, Type I or Type II, Class A, one-part moisture-cured non-sag, permanently flexible polyurethane self-priming sealant suitable for usage and substrate.
   2. Joint Movement Range: 25 to 40 percent.
   3. Service Life: Min. 20 years.
   4. Ultimate Tensile Strength: 250 to 500 psi.
   5. Shore A Hardness: 30 to 80 @ 75 deg. F. and 50 percent rh.
   6. Color: As selected.
   7. Acceptable Manufacturers: Mameco International, Sika Chemical Corp., Sonneborn.

E. Type D:
   1. Description: FS TT-S-00227E, Type I or Type II, Class A two-part, non-sag modified polyurethane polymer formulated with built-in adhesion additives for self-priming suitable for usage and substrate.
   2. Joint Movement Range: 25 to 40 percent.
   3. Service Life: Min. 20 years.
   4. Ultimate Tensile Strength: 150 - 400 psi.
   5. Shore A Hardness: 50 to 100 @ 75 deg. F. and 50 percent rh.
   6. Color: As selected.
   7. Acceptable Manufacturers: Pecora Corp., Mameco International, Williams Products Inc., Sonneborn, W.R. Meadows.

F. Type E:
   1. Description: FS TT-S-001543, Class A one-part non-sag low modulus silicone rubber sealant.
   2. Joint Movement Range: 12 to 50 percent.
   3. Service Life: Min. 20 years.
   4. Ultimate Tensile Strength: 250 to 450 psi.
   5. Shore A Hardness: 30 to 50 @ 75 deg. F. and 50 percent rh.
   6. Color: As selected.
   7. Acceptable Manufacturers: Pecora Corp., W.R. Meadows, Rhone-Poulene Chemical Co., General Electric Co., Dow Corning Corp.

G. Type F:
   1. Description: FS TT-S-001543, one-part non-sag low modulus sanitary silicone rubber sealant.
   2. Joint Movement Range: 12 to 50 percent.
   3. Service Life: Min. 20 years.
   4. Ultimate Tensile Strength: 250 to 450 psi.
   5. Shore A Hardness: 30 to 50 @ 75 deg. F. and 50 percent rh.
   6. Color: White.
   7. Acceptable Manufacturers: General Electric Co., Dow Corning Corp.

H. Type G:
   1. Description: FS TT-S-230C, Type II, Class B, solvent-base, high performance 100 percent acrylic sealant.
   2. Joint Movement Range: 10 to 20 percent.
   3. Service Life: Min. 20 years.
   4. Ultimate Tensile Strength: 40 to 60 psi.
   5. Shore A Hardness: 10 to 50 @ 75 deg. F. and 50 percent rh.
   6. Color: White.
   7. Acceptable Manufacturers: W.R. Meadows Model Easaply, Pecora, VIP Enterprises.

I. Joint Filler Materials:
   1. Compressible Rod: Use for proper performance of joint, compatible with sealant and as recommended by sealant manufacturer.

2. Joint Filler: Select shape and size of joint filler in consultation with sealant manufacturer for proper performance in specific condition of use.

J. Miscellaneous Materials:
1. Joint Cleaner: Provide cleaner recommended by manufacturer of sealant for specific joint surface and condition.
2. Joint Primer and Sealer: Provide compounds recommended by manufacturer of sealant for specific joint surface and condition.
3. Bond Breaker Tape: Pressure-sensitive polyethylene tape.
4. Provide weep hole form fillers to meet requirements and manufacturer's recommendations.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine substrates, adjoining construction, and conditions under which Work is to be installed.

B. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. Clean surfaces and remove protective coatings which might interfere with bond of compound.

3.02 PREPARATION

A. General:
1. Do not apply sealants to joint surfaces previously painted or treated with sealer, curing compound, water repellant, or other coating unless laboratory durability test of bond-cohesion has been performed to demonstrate that bond will be durable.
2. Comply with test method procedures applicable to particular sealant.
3. Do not apply paint and other coatings or substances to surfaces adjoining joint surfaces until sealants are installed and nominally cured to prevent impairment by migration of such substances into joint surfaces.

B. Coated Metal Joint Surfaces:
1. Clean bonding surfaces unless coated metal joint surfaces have been successfully tested for bond-cohesion of sealant.
2. Clean bonding surfaces to base, non-oxidized metal by sanding, wire brushing, or clean with Toluol, Zylol, Xylene, MEK, or other process recommended by sealant manufacturer.
3. Clean immediately before sealant installation.

C. Concrete and Masonry Joint Surfaces:
1. Etch bonding surfaces with five percent solution of

muriatic acid to remove excess alkalinity.
2. Rinse thoroughly with diluted ammonia solution and then with clean water.
3. Insure surfaces are dry before sealant installation.

D. Ceramic Tile and Similar Joint Surfaces: Abrade edge surfaces to be bonded with sealants to remove glassy surface.

3.03 INSTALLATION

A. General:
1. Prime or seal bonding joint surfaces as recommended by sealant manufacturer, taking care to avoid migration of primer or sealer onto adjoining surfaces; remove spillage promptly.
2. Install bond breaker to prevent bonding of sealant to surfaces where such bond might impair performance of sealant.
3. Do not puncture surface of skin of compressible rod type bond breaker.
4. Comply with manufacturer's printed instructions, except as otherwise directed and recorded by manufacturer's representative.
5. Provide weep holes as required.

B. Sealant Depth:
1. Apply sealant to depth shown or, if not shown, apply to manufacturer's recommendations and following general proportions and limitations.
2. Horizontal Joints, Sidewalks, and Pavement: Depth equal to 75 percent of joint width, min. 3/8 in., max. 3/4 in.
3. Non-Traffic or Non-Abrasion Surfaces: Depth equal to 50 percent of joint width, min. 1/4 in., max. 1/2 in.

C. Joint Sealant Placement:
1. Apply compounds in continuous beads or rivers, filling joint from bottom without openings, voids, or air pockets.
2. Force compounds to sides of joint so as to carefully and thoroughly "wet" opposite joint bond surfaces, forming equal areas of contact with sealant.
3. Confine compound to joint areas indicated by use of masking tapes or other precautions to prevent spillage or migration onto adjoining surfaces.
4. Compress joints accurately so that excess compound will not exude from joint.
5. Tool exposed surfaces to compress sealant to profiles indicated or, if none is shown, tool surface slightly concave except provide a slight wash on horizontal joints where horizontal and vertical surfaces meet.
6. Pour self-leveling grade compounds in horizontal

joints to level indicated or, if none is shown, to level 1/16 in. below adjoining surface.
7. Against rough surfaces or in joints of uneven widths, avoid appearance of excess sealant by locating sealant well back into joint where possible.
8. Remove excess sealant promptly as Work progresses.
9. Clean adjoining surfaces as necessary to eliminate any evidence of spillage.

3.04 PROTECTION

A. Cure sealants to manufacturer's instructions to obtain maximum bond to surfaces, cohesive strength, and durability at earliest possible date.

B. Advise concerning proper procedures for protection of sealants during remainder of construction period.

C. Repair and replace sealants damaged or showing evidence of deterioration before time of final acceptance.

D. Protect weep holes against clogging during construction.

3.05 SCHEDULE

A. General:
1. Refer to Paragraph 2.01 MATERIALS of this Section for clarification of sealant types as listed in this application paragraph.
2. Sealant types as listed in this application paragraph are organized in order of preference, with first listing being highest preference and last listing being lowest preference.

B. Between Similar Materials - Movement up to 10 percent:
1. Concrete:
a. Joint Width - 1/4 to 3/4 in: Type E, B, or D.
b. Joint Width - 3/4 in. and Larger: Type B, D, or A.
2. Masonry:
a. Joint Width - 1/4 to 3/4 in: Type E, B, or D.
b. Joint Width - 3/4 in. and Larger: Type B, D, or A.
3. Metal:
a. Joint Width - 1/4 to 3/4 in: Type B, D, or E.
b. Joint Width - 3/4 in. and Larger: Type B, D, or E.
4. Wood:
a. Joint Width - 1/4 to 3/4 in: Type G.
b. Joint Width - 3/4 in. and Larger: Type G.

C. Dissimilar Materials - Differential Movement up to 10 Percent:
1. Metal to Metal:
a. Joint Width - 1/4 to 3/4 in: Type B, D, or E.
b. Joint Width - 3/4 in. and Larger: Type B, D,

A, or E.

2. Metal to Wood:
   a. Joint Width - 1/4 to 3/4 in: Type G.
   b. Joint Width - 3/4 in. and Larger: Type G.
3. Metal or Wood to Masonry/Concrete:
   a. Joint Width - 1/4 to 3/4 in: Type B, D, or E and use only Type G for wood related locations.
   b. Joint Width - 3/4 in. and Larger: Type B, D, E, or A and use only Type G for wood related locations.
4. Metal or Wood to Glass:
   a. Joint Width - 1/4 to 3/4 in: Type E, B, or D and use only Type G for wood related locations.
   b. Joint Width - 3/4 in. and Larger: Type E or B and use only Type G for wood related locations.

D. Special Conditions - Movement up to 10 Percent:
1. Concealed Locations:
   a. Joint Width - 1/4 to 3/4 in: Type B, D, A, or C.
   b. Joint Width - 3/4 in. and Larger: Type B, D, or A.
2. Wet Locations: Type F.

- END OF SECTION -

DIVISION 8

DOORS and WINDOWS

SECTION 08100

METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
1. Flush Doors.
2. Fire Rated Doors.
3. Hollow Metal Door Frames.
4. Gasketed Frames.
5. Insulated Metal Door.
6. Metal Bifold Door.

B. Related Work:
1. Section 04200, Unit Masonry.
2. Section 07900, Joint Sealers.
3. Section 08210, Wood Doors.
4. Section 08710, Finish Hardware.
5. Section 09900, Painting.

1.02 QUALITY ASSURANCE

A. Design Criteria:
1. NFPA 80, Fire Doors and Windows.
2. NAAMM, Hollow Metal Technical and Design Manual for Custom Hollow Metal Doors and Frames.
3. SDI 100-83, Recommended Specifications, Standard Steel Doors and Frames.
4. ANSI A151.1-80, Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing.
5. ANSI A123.1-82, Nomenclature for Steel Doors and Steel Door Frames.
6. ANSI A224.1-80, Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples:
1. Shop Drawings: Detail shapes, trim, and method of anchoring frames.
2. Certificates of Compliance: Provide for labeled doors.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protection:
1. Protect hollow metal units from damage during transit, storage, and installation.
2. Tool marks, rust, blemishes, and any other damage on exposed surfaces will not be acceptable.

3. Protect units during construction period so they will be without any indication of deterioration, use, or damage at time of substantial completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel:
1. Sheet Steel: ASTM A366-72(79), Class C, 16 gage, free from scale, pitting, or other defects; E finish, stretcher leveled for doors.
2. Galvanized Sheet Steel: ASTM A526-80, galvanized in accordance with ASTM A525-80a, Coating Designation G90, phosphatized; stretcher leveled for doors.
3. Reinforcement Steel: ASTM A36-77a.

B. Fasteners: Galvanized or cadmium-plated steel.
1. Bolts and Nuts: ASTM A307-80, Grade A.
2. Expansion Bolts: Expansion shield self-drilling tubular expansion shell bolt anchors, Type 1 or 2.
3. Machine Screws: Carbon Steel, cross-recessed, flat head, min. tensile strength 60,000 psi.

C. Shop Primer: Zinc-chromate, red iron oxide applied to requirements of Section 09900, Painting.

2.02 FABRICATION

A. General - Doors:
1. Fabricate doors and panels to 1-3/4 in. thickness.
2. Take field measurements where coordination with adjoining work is necessary.
3. Form exposed surfaces free from warp, wave, and buckle with all corners square.
4. Dress welded joint on exposed surfaces smooth, invisible after finishing.
5. Make hollow metal work strong, rigid, neat in appearance, and free from defects.
6. Clearances:
   a. Jambs and Heads: 3/32 in.
   b. Bottom With Threshold: 1/8 in. above threshold.
   c. Allow for weatherstripping as required.
7. Lock Edges:
   a. Single Doors: Bevel lock edge 1/8 in. in 2 in.
   b. Fire Rated Doors: Overlapped steel astragal as indicated.
8. Hardware Preparation:
   a. Hinge: Mortise and reinforce with min. 14 ga. steel, die formed to provide screw thread depth equivalent to 10 ga.
   b. Lock: Reinforce with min. 14 ga.
   c. Closer: Reinforce with min. 14 ga. for surface mounted overhead closer.
   d. Die-form back-up reinforcements to extend min.

5 in. into interior.

9. Miter:
   a. Full miter continuously welded on back side at frame corners and stops with edges straight and true except at knocked-down frames.
   b. Grind welds smooth and flush on exposed surfaces.
   c. Accurately machine, file, and fit exposed connections with hairline joints unless indicated otherwise.
10. Fastenings: Concealed where possible, countersink exposed screws using flat or Phillips head screws.

B. Flush Doors:
1. Fabricate face sheets of 16 ga. for exterior doors and 18 ga. for interior doors CRS leveled, mechanically interlocked vertical door edges, face sheets flush seamless.
2. Do not use inverted channels.
3. Securely bond filler to face sheets of door.
4. Reinforce face sheets with 20 ga. interlocking C or Z shaped members spaced max. 6 in. apart and spot welded to face sheets.

C. Labeled Fire Doors:
1. Comply with ASTM E152-80, NFPA 252, and UL-10(b) for fire tests.
2. Affix label to all UL classified fire doors, listed fire door frames, or FM approved fire doors and frames.

D. Insulated Metal Door:
1. Galvanized steel panels with formed edges which lock into kiln-dried wood stiles and rails.
2. Core: Foamed-in-place polyurethane.
3. Finish: Shop primer, paint to requirements of Section 09900, Painting.
4. Hinging: Mortise for three 4 in. x 4 in. standard radius hinges.
5. Acceptable Manufacturer: LST Corp. Div. Therma Tru.

E. Metal Bifold Door:
1. 18 ga. CQ Class 1 steel with all exposed edges eased and finished.
2. Louvers: Pressed.
3. Hardware:
   a. Hinges: Concealed, brass.
   b. Pivots and Guides, Track: Extruded Aluminum, floating pivot guides, four wheel ball bearing hanger unit.
   c. Knobs: Manufacturer standard item.
4. Provide wrench to Owner for vertical and horizontal adjustment.
5. Acceptable Manufacturer: Slimfold Mfg. Co.

F. General - Frames:

1. Metal Gage: 16 ga. for interior and 14 ga. for exterior.
2. Hardware Preparation:
   a. Hinge Reinforcement: 7 ga. steel.
   b. Strike Reinforcement: Universal type 12 ga. steel.
   c. Refer to Section 08710, Finish Hardware for hinge size.
   d. Mortise lock jamb to ANSI A115.1 and A115.2 universal lock strike.

G. Pressed Metal Frames:
1. Description: Designed specifically for installation after erection of drywall partitions with double return backbends to enable frame to grip partition without marring wall surface.
2. Size frame depth to fit wall thickness.
3. Provide with adjustable plumb anchors and sill anchors by fasteners through dimpled holes near bottom of each jamb face.

H. Hollow Metal Frames:
1. Description: Provide from standard catalog frame depths as detailed on Drawings.
2. Provide with appropriate jamb anchors and with floor anchors adjustable to sit in two positions, flush or 1 in. below finish floor.
3. Plaster Guards: Snap-in type.

I. Shop Painting:
1. Clean, treat, and paint surfaces of fabricated metal inside and out whether exposed or concealed in construction.
2. Apply two coats of metal primer to all metal door and frame materials.
3. Apply sufficient number of coats of enamel filler, baked-on to obtain uniform smooth surface and apply one coat of primer baked-on to all surfaces.
4. Finish Coat: Field applied as specified in Section 09900, Painting.

J. Anchors:
1. Tee-shaped, corrugated, or perforated metal set into adjoining masonry or concrete construction.
2. Use adjustable anchors with friction fit for frames set into masonry.
3. Fabricate anchors of steel of same or heavier gage than used for frame, 2-1/2 in. wide x 10 in. long.
4. Use 3 per jamb up to 7 ft. high and 4 per jamb over 7 ft. high.
5. For concrete or masonry placed before setting of frames, anchor frames using 3/8 in. concealed bolts into expansion type shields or inserts, min. 4 per jamb.
6. Use removable stops to cover anchor bolts.
7. Truss - Steel or Punched Stud Walls:
   a. Weld 14 ga. jamb anchor clips 2 ft. o.c. to

each jamb.
b. Match anchor clips to size and type of stud.
c. Drill holes spaced for wire tying frame to stud.

8. Drywall Steel Stud Walls:
a. Weld 16 ga. anchor clips 2 ft. o.c. to each jamb and head.
b. Match anchor clips to size and type of stud.

K. Acceptable Manufacturer: Allied Steel Corp., The Ceco Corp., Steelcraft, Fenestra Corp.

PART 3 EXECUTION

3.01 INSTALLATION

A. Frames: Set hollow metal frames at locations shown, in perfect alignment and elevation, plumb, level, true, straight, and free from rack, braced to prevent displacement.

B. Anchorage:
1. Extend frame anchorages below sills and finishes, except over membrane waterproofed areas.
2. Anchor bottom of frames to floors with anchor bolts or with power drive fasteners.
3. Coordinate installation of built-in anchors for wall and partition construction, as required, with other work.
4. Min. three wall anchors and one clip-angle floor anchor per jamb.
5. Jamb and head extensions 12 ga. steel.
6. Wall Anchors - Concrete and Masonry: Flat-head, through bolts, min. 3/8 in. dia. set into expansion shields.
7. Wall Anchors - Other Construction: As required and type suited to application.
8. Grout full of mortar space between backs of frames and masonry with anchors securely bedded in mortar joints.

C. Temporary Braces: After wall construction has been completed, remove temporary braces.

D. Hardware:
1. Apply hardware in accordance with hardware manufacturer's instructions.
2. Anchor panels in place with concealed fasteners.
3. Adjust door installation to provide uniform clearance at head and jambs and to contact stops uniformly.
4. Remove and replace doors found to be warped, bowed, or otherwise damaged and cannot be properly fitted in frames.

- END OF SECTION -

SECTION 08210

WOOD DOORS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
1. Hollow Core.
2. Solid Core.
3. Stile and Rail Glass Door.

B. Related Work:
1. Section 06100, Rough Carpentry.
2. Section 07900, Joint Sealers.
3. Section 08100, Metal Doors and Frames.
4. Section 08710, Finish Hardware.
5. Section 08800, Glazing.
6. Section 09900, Painting.

1.02 QUALITY ASSURANCE

A. Reference Standards:
1. AWI, Section 1300, Architectural Flush Doors.
2. AWI, Section 1500, Factory Finishing, System #3, Premium Grade.
3. NWMA I.S. 1-78.

1.03 SUBMITTALS

A. Provide submittals to form as defined in Section 01340, Shop Drawings, Product Data, and Samples.
1. Shop Drawings.
2. Manufacturer's Data.
3. Certificates of Compliance.

1.04 WARRANTY

A. Pre-Installation Guarantee:
1. Repair or replace with identical door delivered to project site or submit cash allowance for delivered purchase price of door.
2. Replacement with identical door shall be in same stage of fitting and/or finishing as originally supplied by manufacturer.
3. Store and handle wood doors during pre-installation stage so as not to void manufacturer's guarantee.

B. Post-Installation Guarantee: Remove and rehang doors which become defective after installation.

C. Guarantee Period:
1. Hollow Core Doors: Interior use for life of original installation.
2. Solid Core Doors: Interior use for life of origi-

nal installation.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:
1. Face Veneer: Medium density overlay for opaque finished and rotary cut birch veneer for transparent finish.
2. Crossband: Hardwood veneer min. 1/16 in.
3. Adhesive:
a. Face Assembly: Type I waterproof.
b. Core Assembly: Type II water-resistant.
4. Moisture Stripping: Aluminum flashing at top and bottom of doors exposed to weather.
5. Machine for hardware prefitting.
6. NWMA IS 1-78.

B. Hollow Core Doors:
1. AWI Type SHC.
2. Back Veneer: Hardwood veneer.
3. Finish: Opaque.
4. Core: Phenolic impregnated honeycomb.
5. Acceptable Manufacturer: Weyerhauser Company, Algoma, Eggers.

C. Solid Core Doors:
1. AWI Type SLC.
2. Finish: Transparent.
3. Core: Banded low-density wood blocks.
4. Acceptable Manufacturer: Weyerhauser Company, Algoma, Eggers.

D. Stile and Rail Glass Door:
1. Comply with AWI 1400, Premium Grade, veneer stiles with lumber cores.
2. Glazing: Refer to Section 08800, Glazing.
3. Sizes:
a. Stiles, Rails, and Mullions: Refer to Schedule.
b. Veneer: 1/10 in. before sanding.
4. Acceptable Manufacturer: E.A. Nord Co., International Wood Products, Simpson Door Co.

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Do not install doors until masonry, plaster, and tile work are completed and dried in areas to receive doors.

B. Frame and Trim:
1. Metal Frames: Refer to Section 08100, Metal Doors and Frames.
2. Wood Frames: Fabricate to details indicated on

Drawings using materials specified in Section 06100, Rough Carpentry.

3. Seal exterior openings as required using sealants specified in Section 07900, Joint Sealers.

C. Ambient Conditioning:
   1. Condition doors to average prevailing moisture (humidity) of locality before hanging.
   2. Do not subject doors to damaging heat, dryness, or humidity.

D. Machining for Hardware:
   1. Machine doors and panels for hardware using hardware templates.
   2. Touch up prime coat of paint, including stile and rail edges and cutouts.

E. Door Installation:
   1. Install doors in openings as shown.
   2. Provide pilot holes of proper size for screws into particleboard core doors.
   3. Use stainless steel sheet metal screws into particleboard.

F. Hardware:
   1. Apply hardware to hardware manufacturer's instructions.
   2. Adjust door installation to provide uniform clearances and to contact stops uniformly.
   3. Remove and replace doors which are warped, bowed, or otherwise damaged and cannot be properly fitted in frames.

3.02 PROTECTION

A. Protect doors and hardware during construction.

B. Touch up marred finished to perfectly match adjacent surfaces to satisfaction of Architect or replace unit.

- END OF SECTION -

SECTION 08400

ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Framing System.
   2. Aluminum and Glass Door.

B. Related Work:
   1. Section 07900, Joint Sealers.
   2. Section 08710, Finish Hardware.
   3. Section 08800, Glazing.

1.02 QUALITY ASSURANCE

A. Source Quality Control:
   1. Air Filtration Test: ASTM E283-73, no more than 0.5 cfm per lineal foot of net sash perimeter crack at 1.56 psf.
   2. Uniform Test Load: ASTM E330-79, exterior load 30 psf, interior load 30 psf.
   3. Water Penetration Test: ASTM E331-70(75), no water for 15 min. at flowrate of 5 gal. per hr. per sq. ft. with differential pressure across window unit of 6.24 psf.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Shop Drawings: Sections, connections, fasteners, anchors, gaskets.
   2. Manufacturer's Data.
   3. Samples:
      a. Aluminum extrusions assembly with gaskets.
      b. All exposed elements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Extrusions: 6063-T5 alloy and temper.

B. Steel: Refer to Section 05500, Metal Fabrications, for materials, fasteners, and finish requirements.
   1. Fasteners - Exposed: ASTM B633-78, aluminum, stainless steel, or zinc plated steel.
   2. Perimeter Anchors: Aluminum or steel with steel isolated from aluminum framing.

C. Gaskets:
   1. Glazing: EPDM elastomeric extrusions.

2. Frame Weatherstripping: Non-porous, polymeric.

D. Finish: Refer to Section 0550, Metal Fabrications, for white electrostatic paint.

E. Glazing: Refer to Section 08800, Glazing.

F. Finish Hardware:
1. Pivots: Single-acting top and bottom offset.
2. Locks - Active Leaf: Deadlock with two 1-5/32 in. dia. 5-pin cylinders.
3. Locks - Inactive Leaf: One pair flush bolts.
4. Thresholds: 1/2 in. x 4 in. aluminum, mill finish.
5. Closer: Single-acting with back check and adjustable hold open, overhead for metal framed glass doors.
6. Push-Pull: Style F2 push bar and pull plate.

2.02 FABRICATION

A. Entrance System:
1. Frame:
a. Molding: Full tubular sections with min. 3/16 in. wall thickness at exposed face and side, 1/4 in. wall thickness at reversed side walls, 1/8 in. glazing pockets, 4-1/2 in. deep.
b. Members: 2-1/4 in. deep with size, weight, and wall thickness to match door.
2. Door Stile and Rail: Min. 3/16 in. thick side walls, plain face sections, 2-1/4 in. deep.
3. Glazing Molding and Trim Inserts: Min. 1/16 in. thick.
4. Fasteners: 1/4 in. machine bolts threaded min. 1 in. into splines and welded.
5. Acceptable Manufacturer: Kawneer Model Entara.

PART 3 EXECUTION

3.01 PREPARATION

A. Field Measurements: Check all dimensions whether shown or not on Drawings to insure accurate fitting of Work.

B. Do not proceed with installation where adjacent surfaces are incomplete or unacceptable for installation of Work of this Section.

3.02 INSTALLATION

A. Set jambs, head, and sill track level, plumb, and in alignment with manufacturer's instructions.

B. Seal joints between framing and structure to secure a watertight installation.

- END OF SECTION -

SECTION 08520

ALUMINUM WINDOWS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Frame - Aluminum.
   2. Glazing.

B. Related Work:
   1. Section 07900, Joint Sealers.

1.02 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Min. 5 years experience in fabrication of window systems of type specified for Project.
   2. Installer: Min. 5 years experience in installation of window systems of type specified for Project.
   3. Testing Agency:
      a. Perform tests required in source quality control.
      b. Retain agency acceptable to Architect.

B. Source Quality Control:
   1. Air Filtration Test: ASTM E283-73, no more than 0.5 cfm per lineal foot of net sash perimeter crack at 1.56 psf.
   2. Uniform Test Load: ASTM E330-79, exterior load 30 psf, interior load 30 psf.
   3. Water Penetration Test: ASTM E331-70(75), no water for 15 minutes at flowrate of 5 gal. per hr. per sq. ft. with differential pressure across window unit of 6.24 psf.

C. Performance Requirements: A2-HP.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Shop Drawings: Sections, connections, fasteners, anchors, gaskets.
   2. Manufacturer's Data.
   3. Samples:
      a. Aluminum extrusions assembly with gaskets.
      b. All exposed elements.
   4. Test Reports: Reports prepared on source quality control testing.
   5. Certificates:
      a. Certify compliance with specifications.
      b. Certify compliance with codes related to hurri-

cane force wind and load tests complete with engineering data for window unit and anchorage.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver windows to Project site in undamaged condition, store out of contact with ground, and protect against damage.

B. Store windows in upright position in designated areas close to point of installation.

1.05 WARRANTY

A. Provide for windows against failure of materials or installation for period of two years.

B. Include as part of warranty failures due to excessive leakage or air infiltration, excessive deflection, faulty operation of sash, finish or metal deterioration in excess of normal weathering, defects in hardware and weatherstripping.

PART 2 PRODUCTS

2.01 MATERIALS

A. Windows:
1. Frame and Sash: 6063-T5 extruded aluminum, AAMA A123.1 and ANSI 302.9, thermal break.
2. Fasteners: ANSI 302.9.
3. Weatherstripping: Polypropylene weatherstrip and mylar fin seal on non-interlocking rails.
4. Hardware:
   a. Balance: 2 block and tackle counterbalance.
   b. Latch: Two spring loaded on lower sash.
5. Glazing: 5/8 in. clear insulating sealed glass.
6. Finish: AAMA 603.5, color as selected.
7. Screens: Aluminum frame and 18 x 16 fiberglass cloth.
8. Acceptable Manufacturer: Sullivan Model Series 5000.

B. Fasteners:
1. Aluminum Alloy:
   a. Screws and Bolts: AA 2024 or 6061.
   b. Nuts: AA 6262.
   c. Rivets: AA 1100, 6053, or 6061.

C. Finish: Refer to Section 05500, Metal Fabrications, for white electrostatic paint.

D. Sealant: Refer to Section 07900, Joint Sealers.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:
   1. Apply sealant to mounting surface in accordance with window manufacturer's instructions.
   2. Apply protective material where aluminum windows contact dissimilar metals, concrete, or mortar.
   3. Install straight, plumb, level, and free from rack.

B. Protective Coating:
   1. Coat aluminum surfaces adjacent to or in contact with concrete, plaster, or masonry with alkaline-resistant coating of asphaltic varnish 2 mils thick.
   2. Coat aluminum in contact with dissimilar metals other than stainless steel as follows:
      a. Paint with zinc chromate primer and one coat aluminum paint.
      b. Coat painted surface with asphaltic varnish.

C. Secure Units:
   1. Accurately fit with tight joints and intersections.
   2. Reinforce and anchor in place with #2 stainless steel fasteners max. 16 in. o.c. in jambs only.
   3. Adjust sash after completing glazing.

D. Sealant: Refer to Section 07900, Joint Sealers, for materials and application requirements.

3.02 CLEANING

A. Clean exposed surfaces to remove foreign matter and surface blemishes.

- END OF SECTION -

SECTION 08710

FINISH HARDWARE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Hardware Finishes.
   2. Fasteners.
   3. Hardware Items.
   4. Mounting Heights.

B. Related Work:
   1. Section 08100, Metal Doors and Frames.
   2. Section 08210, Wood Doors.
   3. Section 08400, Entrances and Storefronts.

1.02 QUALITY ASSURANCE

A. Reference Standards:
   1. Hardware at Labeled Openings:
      a. Furnish hardware in accordance with NFPA Standard No. 80 for openings specified, shown or specified for a fire rated opening or to receive a UL Label.
      b. In case of conflict between type of hardware specified and type required for fire protection, furnish type required by NFPA and UL.
   2. Panic Hardware:
      a. Comply with UL 305 for fire rated openings.
      b. Furnish hardware to door manufacturer for installation at manufacturer's factory.
      c. Provide supplementary label, "Fire Exit Hardware" on each device to certify hardware has been panic load tested with door.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Templates: Provide templates to meet construction schedules and quantities required for door machining.
   2. Manufacturer's Data.
   3. Sample Items: Provide for review of design, pattern, finish, and color only. Unblemished samples may be used on Project on Architect's approval.
   4. Schedules: Provide five complete hardware set schedules and keying schedules coordinated with manufacturer's data and samples within 10 days after receipt of written request for review with Architect.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Package and label each item of hardware separately.
   1. Tag each item in accordance with final hardware schedule.
   2. Each package shall contain appropriate fastenings, instructions, and installation templates.
   3. Protect all items from loss or damage in shipment.

B. Storage:
   1. Submit copies of shipping receipts to Architect on delvery of hardware to job site.
   2. Store all hardware in locked storage areas.
   3. Replace all missing or damaged items immediately to prevent scheduling problems.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:
   1. Provide complete Hardware Set Schedule for application of individual items as required for each opening or function and review with Architect and Owner before purchase of hardware.
   2. Hardware Finishes:
      a. Produce finishes to exact match with selected sample(s).
      b. Reduce variance in hue of each finish whether base metal is cast, forged, or stamped, or when plating is applied over steel, brass, or bronze.
      c. Match finishes of same designation from two or more sources when viewed at arms' length and approx. 2 ft. apart.
      d. Unless otherwise specified, match finish of each item of hardware with finish selected for lock sets and latches.
      e. Indicate type of finish in Hardware Schedule.
   3. Fasteners:
      a. Provide concealed fastening wherever possible.
      b. Use of self-tapping or sheet metal screws is prohibited except for application of flush mounted push and kick plates.
      c. Concealed: Furnish hardware items with appropriate type and length of screws or other fastenings suitable to ensure permanent anchorage.
      d. Exposed: Furnish hardware with countersunk oval Phillips head type screws where concealed fastening is not possible.
      e. Finish to match that of hardware item being fastened.
   4. Acceptable Manufacturer:
      a. Hinges: Hager, Stanley.
      b. Locks and Latches: Adams Rite, Schlage.
      c. Panic Devices: Von Duprin, Russwin.
      d. Closers: LCN, Russwin.

e. Accessories: Ives, Baldwin, Pemko, Zero, Sager.

B. Hinges:
1. Pack all hinges with machine or wood screws as required by door and frame construction.
2. Furnish hinges with leaves of width to clear door jamb or trim products.
3. Furnish template hinges in accordance with door and frame material requirements.
4. Hinge Type: Standard weight, two ball bearings, painted steel for interior and brass for exterior, full mortise, 4-1/2 in. high, 0.134 in. ga., non-rising pin for interior and non-removable pins for exterior, flush tip.
5. Hinge Quantity: Up to 60 in. high doors provide two butts and for each 30 in. additional height provide one addtional butt.

C. Latches and Locks:
1. Furnish lock sets and latch sets with anti-friction deadlocking latch bolts and deadlocks.
2. Provide lock sets, latch sets, or deadlocks complete with trim and armor fronts.
3. Conceal fastenings, washers, and bushings.
4. Provide wrought box strikes for each lock set, latch set, or deadlock with curved lips of sufficient length to protect frames.
5. Heavy duty construction with min. 0.093 in. thick wrought case.
6. Knobs and Roses: ANSI A156.2-76.
7. Provide latchsets and locks of one manufacturer.
8. Deadlocks:
   a. Furnish deadlocks from same manufacturer as lock sets and latch sets, with same turnpiece and cylinder trim as furnished for lock sets and latch sets.
   b. Provide units with 1 in. throw bolts typical at all exterior apartment doors. Architect.
9. Latchbolts: Min. 5/8 in. projection.
10. Provide handicapped accessible and operable latches and locks.

D. Panic Devices:
1. Furnish panic devices as required to following requirements:
   a. Mounting: Furnish devices with provision for concealed mounting; throughbolts will not be accepted.
   b. Keying: Key cylinders to building system as specified.
   c. Bolts: Provide retract feature for all concealed vertical rod devices provided at center hung doors.

E. Overhead Closers:

1. Closer size per manufacturer's recommendation for application.
    a. Full rack and pinion.
    b. Independent closing speed and latch regulating valves.
    c. Adjustable back-check.
    d. 180 degree opening where construction will permit.

F. Accessories:
1. Wall Bumpers: Wrought disc type with convex rubber bumper and concealed attachments suited to substrate.
2. Door Mutes: Furnish for hollow metal frames, 3 door mutes for each single door and 4 door mutes for each pair of doors.

G. Miscellaneous Hardware:
1. Door bottom seal.
2. Head and jamb gaskets.
3. Astragal gaskets.
4. Weatherstripping.

H. Keys and Keying:
1. Provide Masterkey System to requirements indicated on Drawings, with no substitutions allowed.
2. Review specific keying applications with Owner before purchasing locks and cylinders, to ensure proper security of completed Work.

PART 3 EXECUTION

3.01 INSTALLATION

A. Following mounting heights apply throughout Work, unless otherwise shown or specified.
1. Lock Sets and Latches: 38 in. to center of knob from floor.
2. Butt Hinges:
    a. 10 in. to bottom of lowest hinge from floor.
    b. 5 in. to top of upper hinge from top of door.
    c. Space other hinges equally between lower and upper hinges.
3. Door Pulls:
    a. 45 in. finish floor to center of pull.
    b. Center line in 5 in. from edge of flush doors.
4. Deadlocks: Center line of cylinder to align with center line of cylinder for lock sets.
5. Crossbar of Panic Devices: 42 in. finish floor to center of crossbar.

B. Deliver hardware for doors as shown and scheduled, and as specified in applicable hardware portions of these Specifications.

C. Store in a locked space to prevent loss.

D. Apply to doors as recommended by hardware manufacturer and as required.

E. Fit locks and latch sets in their respective doors and remove before painting.

F. Reinstall after painting of doors is completed.

G. On completion adjust and lubricate hardware for proper operation.

H. Instruct Owner's personnel in proper adjustment and maintenance of hardware.

I. Extra Sets: Deliver 5 extra sets of each type of lock and latch per residential complex to Owner.

3.02 ADJUSTING AND CLEANING

A. Adjustments:
1. Assist installer in adjusting and checking installation of finish hardware.
2. Furnish proper lubricant, graphite, or special oil to installer.
3. Check, test, and adjust moving parts to ensure free and smooth operation.
4. Furnish to Owner special tools required to adjust and maintain hardware.

B. Post-Installation Adjustments:
1. After building is completed and in use, assist installer with adjustment of hardware to compensate for air movement and other conditions, so all items will operate properly.
2. Examine all hardware furnished, with Owner's Representative 6 months after preliminary acceptance by Owner.
3. Adjust hardware for proper operation.

- END OF SECTION -

SECTION 08800

GLAZING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Glass.
   2. Wire Glass.

B. Related Work:
   1. Section 07900, Joint Sealers.
   2. Section 08100, Metal Doors and Frames.
   3. Section 08210, Wood Doors.
   4. Section 08400, Aluminum Entrances and Storefronts.

1.02 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Manufacturer's Data.
   2. Samples: Min. 12 in. x 12 in.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver glass to site in containers that will protect from weather and damage.

B. Store materials carefully in safe place to prevent breakage.

C. Deliver materials in unopened, labeled containers bearing manufacturer's name and brand identification.

PART 2 PRODUCTS

2.01 MATERIALS

A. Type A Glass:
   1. Thickness: 1 in. overall.
   2. Color: Clear.
   3. Type: Float or tempered insulating, sealed unit, as required and detailed.
   4. Acceptable Manufacturer: PPG Industries, LOF, Guardian.

B. Type B Glass:
   1. Thickness: 1/4 in.
   2. Color: Clear.
   3. Type: Tempered safety glass, as detailed.
   4. Acceptable Manufacturer: PPG Industries, LOF, Guardian.

C. Wire Glass:

1. Thickness: 1/4 in.
2. Color: Clear.
3. Type: UL rated, square pattern.

D. Glazing Compound: FS TT-6410. Color as selected.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect members to be glazed and notify Architect of any defects, improper materials or work, and other conditions which may affect satisfactory installation of glass.

B. Do not proceed with glazing until such conditions have been corrected.

C. Inspect each piece of glass immediately before installation and eliminate glass which has observable edge damage or face imperfections.

3.02 INSTALLATION

A. Comply with combined recommendations of glass manufacturer and manufacturer of other materials used in glazing, except where more stringent requirements are shown or specified and except where manufacturer's technical representatives direct otherwise, in writing, and approved by Architect.

B. Comply with "Glazing Manual" of FGMA, except as shown and specified otherwise, and except as specifically recommended otherwise by manufacturers of glass and glazing materials.

3.03 ADJUSTING AND CLEANING

A. Wash and polish glass on both faces before Owner's acceptance of Work.

B. Comply with glass manufacturer's published directions.

C. At completion of Work, all glass shall be free from cracks and other defects.

D. Any defective glass that may appear before acceptance or within one year warranty period (if a direct result of manufacturing, transporting, or performance of the Contract) shall be removed and replaced with new glass without cost to Owner.

- END OF SECTION -

DIVISION 9

FINISHES

SECTION 09110

NON-LOAD BEARING WALL FRAMING SYSTEM - EXTERIOR

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Non-Load Bearing Framing System.

B. Related Work:
   1. Section 09250, Gypsum Board.

1.02 QUALITY ASSURANCE

A. Reference Standards:
   1. PIB, Lathing and Plastering Reference Data and Specification Guide.
   2. GA, Fire Resistance Design Manual.
   3. ML/SFA, Specifications for Metal Lathing and Furring.
   4. UL, Fire Resistance Index.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Shop Drawings: Detail all typical connections and framing of wall openings.
   2. Manufacturer's Data.
   3. Certificates: Indicate compliance with Specifications.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:
   1. Provide of type, size, gage, and spacing as detailed and specified.
   2. Fabricate all members to AISI Specification for Design of Cold-Formed Steel Structural Members.

B. Galvanized:
   1. Studs, Track, Bridging, and Accessories: ASTM A446-76(81), Grade A, 33,000 psi minimum yield; 18 and 20 ga.
   2. Finish: Hot-dipped galvanized steel, Designation G-60.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

1. Cut framing components square for attachment to perpendicular members or when indicated for angular fit against abutting members.
2. Install axially loaded studs positioned against inside of track web before attaching to stud and runner track arrangement.
3. Fasten components using self-drilling screws or welding.
4. Weld to AWS D1.1.
5. Securely anchor track to supporting structure as indicated.
6. Space studs max. 16 in. o.c.
7. At track butt joints, securely anchor abutting pieces to common structural element, or butt-weld or splice together.
8. Plumb, align, and securely attach studs to flanges or webs of both upper and lower tracks.
9. Install jack studs or cripples below window sills, above window and door heads, at free standing stair rails to furnish support and securely attach to supporting members.

B. Erection - Wind Load Only:
1. Attach wall stud bridging to prevent stud rotation.
2. Space bridging rows with one row for walls to 10 ft.-0 in. and space at max. 5 ft.-0 in. o.c. for walls over 10 ft.-0 in.
3. Provide for structure vertical movement as indicated or to manufacturer's recommendations.

3.02 FIELD QUALITY CONTROL

A. Tolerances:
1. Variation From Plane of Wall: 1/4 in. in 10 ft.
2. Variation From Plumb: 1/4 in.
3. Variation From Level: 1/8 in. in 3 ft., 1/4 in. in 10 ft., max. 1/2 in.
4. Alignment: Max. 1/4 in. from true line.

- END OF SECTION -

SECTION 09200

LATH AND PLASTER

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
1. Simulated Acoustical Plaster.

B. Related Work:
1. Section 09250, Gypsum Board.

1.02 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
1. Manufacturer's Data.

PART 2 PRODUCTS

2.01 MATERIALS

A. Plastering Materials - Simulated Acoustical:
1. Machine mixed at factory of perlite and bonding ingredients.
2. Coverage: 15 sq. yd. per bag.
3. Acceptable Manufacturer: Premix-Marbletite Mfg. Co. Model P.V.L.

2.02 MIXES

A. Simulated Acoustical Plaster:
1. Use mechanical mixer and mix to consistency for spraying.
2. Mix for 10 minute period and allow to set for 10 minutes before use.
3. Add slight amount of water if too heavy for spray equipment.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine substrates and conditions under which Work is to be installed.

B. Do not proceed until unsatisfactory conditions detrimental to proper and timely completion of Work have been corrected.

3.02 INSTALLATION

A. Application - Ceiling Finish:
1. Apply using spray gun developing 15 to 20 lbs. of

air pressure at nozzle.
2. Apply one coat to 1/8 in. thickness.
3. Apply second coat if needed to eliminate form lines or surface imperfections where indicated by Architect.

B. Patching:
1. Work containing cracks, blisters, pits, checks, or discoloration will not be accepted.
2. Remove such Work, including rejected Work, and replace with new.
3. Patching of defective Work permitted only after notification of Architect.
4. Perform cutting, patching, repairing, and pointing-up operations neatly and thoroughly.
5. Repair cracks and indented surfaces by moistening plaster and filling with new material, troweled or tamped flush with adjoining surfaces.
6. Point-up and finish surfaces around fixtures, outlet boxes, piping, fittings, tile, and other work flush with adjacent plaster.
7. Where new plaster adjoins plaster installed more than 48 hours, cut existing plaster at angle of approximately 45 degrees with surface before installing new plaster.

3.03 ADJUSTING AND CLEANING

A. Make provisions to eliminate spattering of plaster on other work.

B. Promptly clean windows and other surfaces which have been soiled.

C. Protect plaster from weather, premature drying, marking, dirt, dust, marring, or other damage throughout construction period free from any indication of damage at time of acceptance by Owner.

- END OF SECTION -

SECTION 09250

GYPSUM BOARD

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Framing and Furring.
   2. Gypsum Board.
   3. Fasteners.
   4. Accessories.

B. Related Work:
   1. Section 07200, Insulation.
   2. Section 09110, Non-Load Bearing Wall Framing System.
   3. Section 09200, Lath and Plaster.
   4. Section 09300, Tile.
   5. Section 09900, Painting.

1.02 QUALITY ASSURANCE

A. Reference Standards:
   1. GA, Fire Resistance Design Manual, 11 Edition.
   2. UL, Fire Resistance Directory.
   3. UL, Building Materials Directory.
   4. GA 216, Recommended Specifications for Application and Finishing of Gypsum Board.

1.03 SUBMITTALS

A. Provide submittals for form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Manufacturer's Data: Provide product literature and installation instructions.
   2. Certificates: Certify fire resistance construction conforms to UL and GA standards.

1.04 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Cold Weather Installation: Maintain building temperature between 55 deg. to 70 deg. F.
   2. Provide adequate ventilation to carry off excess moisture.

B. Sequencing:
   1. Deliver materials to Project site at stage required for installation.
   2. Store in dry, ventilated space, off ground, and deliver to work areas as required for erection.

PART 2 PRODUCTS

2.01 MATERIALS

A. Metal Interior Framing and Furring:
   1. General:
      a. Non-Load Bearing: ASTM C645-83, Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
   2. Studs:
      a. Gage: Provide stud of gage to meet specification and thickness indicated on Drawings or UL Fire Resistance Directory.
      b. Deflection Limit: L/360 for grid suspension members and L/240 for other locations.
      c. Fire Rating: As specified and where detailed on Drawings.
   3. Rigid Furring Channels:
      a. Gage: Provide channel of gage to meet Specification and thickness indicated on Drawings.
      b. Deflection Limit: L/360 for grid suspension members and L/240 for other locations.
      c. Size: Min. 3/4 in. deep with min. 1/2 in. attachment flanges.
   4. Runners (Track): Friction fit, U-shaped configuration to same depth as studs, min. 1 in. flange height.
   5. Wire Hanger Inserts: No. 6 monel wire loop and 26 ga. monel shell or 14 ga. monel steel strap with 5/16 in. hole.
   6. Strap Iron Hanger Inserts: Mild steel flats, 1 in. x 3/16 in. with 7/16 in. holes punched on center line and lower ends, designed to develop full strength of hangers.
   7. Runner Channel Support Hangers:
      a. Monel soft steel wire min. 8 ga., 1/4 in. round steel pencil rods, flat iron, or soft steel straps 3/16 in. x 1 in.
      b. Use wire hangers of monel metal min. 0.125 in. dia. in high humidity areas.
   8. Brackets: 20 ga. galvanized steel with serrated edges, adjustable from 1/4 in. to 2-1/4 in.
   9. Tie Wire:
      a. Use to tie furring channels to runner channels.
      b. Min. 16 ga. monel.
      c. Use monel metal in high humidity spaces.

B. Metal Exterior Framing:
   1. Non-Load Bearing: Refer to Section 09110, Non-Load Bearing Wall Framing System.

C. Gypsum Board:
   1. Regular: ASTM C36-84, 1/2 in. thick tapered edges.
   2. Fire Resistive (Type X): ASTM C36-84, 5/8 in. thick with 1 hr. rating and 1/2 in. thick with 3/4 hr. rating, tapered edges.
   3. Water-Resistive:
      a. ASTM C630-84, 1/2 in. thick, tapered edges.

b. Fire Resistive (Type X): ASTM C630-84, 5/8 in. thick with 1 hr. rating and 1/2 in. thick with 3/4 hr. rating, tapered edges.

4. Backing Board and Coreboard:
   a. Use as base for multilayer systems, gypsum stud or semi-solid and solid partitions.
   b. Backing Board: ASTM C442-84, 5/8 in., square edges.
   c. Gypsum Coreboard: ASTM C442-84, 3/4 in., square edges.
   d. Fire Resistive Backing Board (Type X): ASTM C442-84, 5/8 in. thick with 1 hr. rating and 1/2 in. thick with 3/4 hr. rating, square edges.
5. Exterior Sheathing:
   a. ASTM C79-84, 1/2 in. thick with water repellant paper bonded to core, V-tongue and groove edges.
   b. Fire Resistive (Type X): ASTM C79-84, 5/8 in. thick with 1 hr. rating, V-tongue and groove edges.
6. Soffit:
   a. ASTM C931-84, 1/2 in. thick, square edges.
   b. Fire Resistive (Type X): ASTM C931-84, 5/8 in. thick with 1 hr. rating and 1/2 in. thick with 3/4 hr. rating, square edges.

D. Trim Accessories:
1. Material: Galvanized metal.
2. Provide the following as required, sized to thickness of gypsum board:
   a. Corner beads.
   b. Casing beads.
   c. Expansion Joint.

E. Screws, Adhesives, and Sealants:
1. Screws:
   a. ASTM C1002-83, Grade 1013 to 1022 steel wire meeting ASTM A548-82.
   b. Gypsum Board to Gypsum Board: Type G.
   c. Gypsum Board to Steel Framing: Type S or use ASTM C954-81, Grade 1018 to 1022 steel wire meeting ASTM A510-82 for steel studs 0.033 in. to 0.112 in. thick.
2. Sealant: Refer to Section 07900, Joint Sealers, for materials and application.

F. Joint Treatment: ASTM C475-81, compound, joint tape, and finishing compound, asbestos-free.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:
1. Install gypsum board and accessories to manufacturer's printed instructions, unless indicated or

specified otherwise.

2. Provide additional framing and blocking as required to support board at openings, cutouts, and built-in anchorages and attachment devices for other work.
3. Openings:
   a. Cut openings in wallboard for electrical outlets, piping, and other penetrations.
   b. Maintain close tolerances so edges will be covered by plates and escutcheons.
   c. Cut both face and back paper.
   d. Do not install electrical outlets back-to-back on opposing sides of partitions.
4. Fasteners:
   a. Install fasteners min. 3/8 in. from ends or edges wallboard sheets, spacing fasteners opposite each other on adjacent ends or edges.
   b. Begin fastening from center of wallboard and proceed toward edges and corners.
   c. Apply pressure on surface of wallboard adjacent to fasteners being driven to ensure that wallboard will be secured tightly to supporting member.
   d. Drive fastener with shank perpendicular to face of board.
   e. Drive screws with a power screwdriver as recommended by wallboard manufacturer.
5. Finishing:
   a. Fill openings around cutouts with acoustical sealant as recommended by manufacturer.
   b. Prefill joints of wallboard having eased edges in accordance with wallboard manufacturer's directions.
   c. Except where water resistant wallboard is used, reinforce all joints at tapered edges and interior corners with joint reinforcing tape set in joint compound.
   d. Fill all joints, fastener heads, trim recesses, cracks, and other depressions with joint compound.
   e. Finish smooth and flush as recommended by manufacturer, so location of joints, nails, screws, and other items will not be visible after painting.
6. Sealants: Refer to Section 07900, Joint Sealers.

B. Non-Rated Partitions, Ceilings, and Columns:
1. Metal Interior Framing System:
   a. Space studs max. 24 in. o.c., unless indicated otherwise.
   b. Align runner tracks accurately to partition layout at both floor and ceiling.
   c. Secure floor channels with nails 24 in. o.c.
   d. At door frames, install special studs recommended by wallboard manufacturer and as indicated.
   e. Align and secure side angle runners to intersecting walls or columns of other materials.

f. Calk behind side angle runners.

2. Metal Exterior Framing: Refer to Section 09110, Non-Load Bearing Wall Framing System.
3. Blocking:
   a. Install to support all items of finish and to cut off all concealed draft openings, both vertical and horizontal, between ceiling and floor areas.
   b. Fire Blocks: Nom. 2 in. in all stud walls at ceiling and floor levels.
4. Sound Control Partitions:
   a. Provide combination of wallboards and framing as indicated.
   b. Apply acoustical sealant in beads under runners at perimeters and intersections to 40 STC rating of wall system as recommended by manufacturer.
   c. Provide acoustical sealant beads to completely seal all openings and joints.
   d. Install acoustical insulation where shown, forming continuous layer for full height of wall and tightly abutting studs.
   e. Fit carefully behind electrical outlets and other penetrations.
5. Bathtub Walls:
   a. Bathtubs: Space studs max. 16 in. o.c.
   b. Fasteners: Use type suitable for stud used in wall framing and space max. 8 in. o.c.
   c. Precut board to size and make necessary cutouts.
   d. Fit ends and edges closely together, max. 1/8 in. gap; do not force tightly together.
   e. Fasten to framing max. 8 in. o.c.
   f. Fill gap at edges and ends with mortar.
   g. Embed 2 in. wide fiberglass tape in skim coat of mortar at joints and corners.

C. Rated Partitions:
1. Steel Frame:
   a. 1 Hr. Rating, 40 to 44 STC, UL Design U-425 and GA WP1206, 5/8 in. Type X secured to 3-1/2 in. 20 ga. steel studs 24 in. o.c. using Type S-12 screws spaced 12 in. o.c. with joints staggered 24 in. o.c. each side.
   b. 2 Hr. Rating, 40 to 44 STC, UL Design U-425 and GA WP1716, 5/8 in. Type X base layer and 5/8 in. Type X face layer each side screwed to 3-1/2 in. 20 ga. steel studs spaced 24 in. o.c using Type S-12 screws spaced 12 in. o.c. with joints staggered 24 in. o.c. each layer and sides.

D. Rated Chase Walls:
1. Steel Framed:
   a. 1 Hr. Rating, 50 to 54 STC, UL Design U-420 and GA WP5015, 5/8 in. Type X applied parallel to double row of 1-5/8 in. metal studs spaced 24

in. o.c. and 6-1/4 in. apart using Type S screws, stagger joints 24 in. o.c. each side and 6-1/4 in. apart.

b. 2 Hr. Rating, 50 to 54 STC, UL Design U-420 and GA WP5130, 5/8 in. Type X base and face layers applied parallel to double row of 1-5/8 in. metal studs spaced 24 in. o.c. and 6-1/4 in. apart using Type S screws, stagger joints each layer and side and 6-1/4 in. apart.

E. Rated Shaft Walls:

1. Steel Framed:

a. 1 Hr. Rating, 40 to 44 STC, GA WP7009, 3/4 in. x 24 in. Type X inserted between 2-1/4 in. floor and ceiling track and 2-1/4 in. slotted metal I-stud with tab-flange, 5/8 in. Type X face layer at right angles to studs using Type S screws 12 in. o.c.

b. 2 Hr. Rating, 40 to 44 STC, GA WP7109, 1 in. x 24 in. Type X inserted between 2-1/2 in. floor and ceiling J runners with 2-1/2 in. T-section C-T metal studs between panels, one layer of 1/2 in. Type X applied at right angles to each side of C-T stud with Type S screws 8 in. o.c., stagger joints each side.

- END OF SECTION -

SECTION 09300

TILE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Glazed Tile.
   2. Glazed Tile Trim.

B. Related Work:
   1. Section 07900, Joint Sealers.

1.02 QUALITY ASSURANCE

A. Source Quality Control:
   1. Provide tile of standard grade conforming to TCA/ ANSI 137.1.
   2. Obtain each material required for any one type and color from single source.
   3. Furnish Master Grade Certificate signed by both tile manufacturer and installer.

B. Reference Standards: Comply with standards of TCA and ANSI as referenced in this Section.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Sample: 12 in. sq. of tile work mounted on plywood backing with grout of each color, pattern, and type of tile intended to be used.
   2. Maintenance Data.

1.04 PROJECT CONDITIONS

A. Environmental Requirements: Maintain temperature at 50 deg. F. min. during tile work and for 7 days after completion.

B. Provide adequate lighting for good grouting and clean up.

PART 2 PRODUCTS

2.01 MATERIALS

A. Glazed Tile:
   1. Description: Cushion edged, self-spacing lugs on all four sides.
   2. Size: 4-1/4 in. x 4-1/4 in.
   3. Color: As selected.
   4. Glaze Finish: Smooth.

5. Use: Walls as indicated.

B. Sealant: Refer to Section 07900, Joint Sealers.

C. Waterproofing Admixture - Grout and Mortar:
1. Latex mortar additive for dry set grouts and mortars.
2. Service Life: Min. 10 years.
3. Compressive Strength: 3000 psi.
4. Bond Strength: 500 psi.
5. Acceptable Manufacturer: Laticrete International Model 3701, Boiardi Products Model Elastiment 150.

D. Latex Thinset Admixture - Grout and Mortar:
1. ANSI A108.5 and ANSI A118.4, compounded and stabilized latex for blending with neat portland cement or portland-sand mix.
2. Service Life: Min. 10 yrs.
3. Compressive Strength: Min. 5,000 psi.
4. Bond Strength - Shear: Min. 600 psi @ 28 days.
5. Water Absorption: Max. 3 percent.
6. Density: 83 lbs. per cu. ft.
7. Acceptable Manufacturer: Laticrete International Model 4237, Boiardi Products Model Elastiment 753.

E. Tile Trim - Glazed:
1. Furnish size, color, and shade to match field tile
2. Base: Use cove straight top for wall tile transition, cove round top for no wall tile transition, and bull nose where cove and no wall tile transition is detailed.
3. Out Corners: Bullnose.
4. In Corners: Rounded.
5. Jambs: Bullnose where tile projects from jamb.

PART 3 EXECUTION

3.01 PREPARATION

A. Report all unacceptable surfaces and do not tile until surface conditions meet requirements specified.

3.02 INSTALLATION

A. Layout:
1. Lay tile to minimize cuts less than one-half tile in size.
2. Locate cuts in walls and floors at least conspicuous location.
3. Lay out tile wainscots to next full tile beyond dimensions indicated.
4. Align all wall joints to achieve straight uniform grout lines, plumb and level.

B. Placing:
1. Clean cut edges before installing.
2. Smooth exposed cut edges.

3. Fit against trim and accessories so escutcheons, plates, and collars will completely overlap cut edges.

C. Setting Methods:
1. Bathtub Walls - Gypsum Board: TCA Method B413-85, organic adhesive and latex-portland cement grout.

3.03 ADJUSTING AND CLEANING

A. Clean surfaces on completion of grouting.

B. Remove all grout haze to manufacturer's instructions.

C. Polish surface with soft cloth.

D. Protect against damage and replace damaged items at no cost to Owner.

- END OF SECTION -

SECTION 09650

RESILIENT FLOORING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Reinforced Vinyl Tile.
   2. Rubber Mat.
   3. Sheet Vinyl.
   4. Base.
   5. Accessories.

1.02 SUBMITTALS

A. Provide submittals to form specified in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Manufacturer's Data.
   2. Manufacturer's Instructions.
   3. Samples: Submit following listed samples:
      a. Resilient Flooring: Each color and type, 12 in. sq.
      b. Resilient Base: Each color and type, 24 in. long.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's unopened containers clearly marked with manufacturer's name, brand, size, thickness, grade, color, and design.

B. Store materials per manufacturer's recommendations

PART 2 PRODUCTS

2.01 MATERIALS

A. Reinforced Vinyl Tile:
   1. FS-SS-T-312B, Type IV composed of vinyl resin, reinforcing fibers, coloring pigment, and inert filler.
   2. Size: 12 in. x 12 in.
   3. Gage: 1/8 in.
   4. Subfloor: Concrete.
   5. Fire Resistance:
      a. Flame Spread Rating: Max. 2.0 for UL Chamber Test 992 and max. 75 for ASTM E84-81a.
      b. Critical Radiant Flux: ASTM E648-78, min. 1.0
   6. Color and Pattern: As selected.
   7. Acceptable Manufacturer: Azrock Floor Products, Armstrong Floor Division, Kentile Floors, Congoleum Corp.

B. Rubber Mat:

1. FS-SS-T-312B, Type II, 100 percent synthetic virgin unrecycled rubber with organic stabilizers, migrating wax, and dirt expelling agents.
2. Size: 18 in. x 18 in.
3. Gage: 1/8 in.
4. Subfloor: Concrete.
5. Fire Resistance:
   a. Flame Spread Rating: Max. 75 for ASTM E84-81a.
   b. Critical Radiant Flux: Min. 0.6 for ASTM E662-83 for Class 1 Interior Floor Finish.
6. Color and Pattern: As selected.
7. Acceptable Manufacturer: Flexco Division of Textile Rubber Co., Roppe Rubber Corp., R.C. Musson Rubber Co.

C. Sheet Vinyl:
1. Residential vinyl corlon sheet floor.
2. Size: 6 ft. wide roll.
3. Gage: 0.070 in.
4. Subfloor: Concrete or wood.
5. Fire Resistance:
   a. Flame Spread Rating: Max. 75 for ASTM E84-81a.
   b. Critical Radiant Flux: Min. 1.08 W per sq. cm. for ASTM E662-83 for Class 1 Interior Floor Finish.
6. Color and Pattern: As selected.
7. Acceptable Manufacturer: Armstrong.

D. Resilient Bases:
1. Solid homogeneous vinyl toe base in continuous lengths.
2. Size: 0.080 in. ga. x 4 in. high.
3. Accessories: Provide inside and outside corners, and end stops where applicable.

E. Accessories:
1. Resilient Base Cement: Resin-base, alcohol soluble, waterproof adhesive.
2. Tile Reducer Strip:
   a. 0.080 in. thick x 1-1/8 in. wide solid vinyl, locate as indicated.
   b. Color: As selected by Architect to match tile or from manufacturer's standard colors.
3. Edging Strips:
   a. 0.080 in. thick, homogeneous vinyl, tapered edge.
   b. Color: As selected by Architect to match tile or from manufacturer's standard colors.
4. Sheet Flooring Adhesive: Use manufacturer's recommended materials for substrate requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed.

B. Do not proceed with Work until unsatisfactory conditions detrimental to proper and timely completion of Work have been corrected.

C. Surface Preparation:
1. Clean substrate to remove deleterious substances which would impair Work.
2. Fill cracks, holes, and depressions in substrate.
3. Surface shall be smooth, level, and at proper elevation.
4. Surface shall not vary more than 1/8 in. in 10 ft. in any direction from level, plumb, or slopes shown.
5. Remove roughness and protrusions from concrete surfaces by grinding.
6. Use compounds for filling complying with resilient flooring manufacturer's recommendations.
7. Prime, seal, or cover substrates which manufacturer of resilient flooring recommend be primed, sealed, or covered.

D. Bond and Moisture Test:
1. Using specified flooring materials, install 3 ft. x 3 ft. panels spaced 50 ft. apart throughout designated floor area.
2. Install test panels with correct pattern direction using adhesive to be used in actual installation.
3. If panels are securely bonded after 72 hrs., surface is to be considered dry and clean of foreign materials.
4. Test panels can be considered securely bonded if unusual force is required to lift from floor and adhesive clings to both floor and back of resilient flooring.

3.02 INSTALLATION

A. Standards: Install resilient flooring in accordance with manufacturer's instructions.

B. Edging Strips: Install in continuous lengths at exposed edges of resilient flooring.

C. Prime Coat:
1. Apply primer to concrete surfaces.
2. Work well into surface.
3. Use quantity to assure complete surface coverage with non-absorptive base.
4. Allow primer to dry before applying adhesive.
5. Prime coat may be omitted if recommended by resilient flooring manufacturer.

D. Adhesive:
1. Apply to substrate with properly notched steel trowels.
2. Allow adhesive to become tacky before applying

resilient flooring.

E. Extensions:
1. Extend resilient flooring into closets and offsets, and under movable equipment of rooms and spaces shown or scheduled to receive resilient flooring, including recessed covers within those spaces.
2. Extend unexposed edges of flooring under set-on bases and similar trim work.
3. Scribe, cut, and fit exposed edges of flooring and base adjoining other Work accurately and neatly with a tight joint.

F. Tile Units:
1. Lay tile units symmetrically about center line of major room or space in a square pattern, unless otherwise shown.
2. Adjust so edge units are not less than one-half of tile width.
3. Lay tile units with bottom surface securely bonded to substrate and top surface left smooth, clean and free from imperfections.
4. Fit tiles tightly with each unit in contact to surrounding tiles and joints in proper alignment.
5. Make neat tight joints where exposed edges abut other surfaces.
6. Lay tile with grain running in a single direction as directed, unless otherwise shown.
7. Align joints both directions in square pattern unless otherwise shown.

G. Sheet Flooring:
1. Lay with minimal seams and economical use of material.
2. Match edges for color shading and pattern at seams.
3. Use conventional full spread adhesive method, unless indicated otherwise.
4. Prepare seams with special routing tool and heat weld with vinyl thread.

H. Resilient Bases:
1. Secure bases to surfaces with waterproof cement.
2. Make joints tight.
3. Keep top and bottom edges in firm contact with adjacent surfaces.
4. Use longest lengths possible.
5. Straight pieces less than 23 in. long not permitted.

3.03 CLEANING AND ADJUSTING

A. Cleaning:
1. Not more than 4 days before acceptance or occupancy by Owner, clean resilient flooring and base.
2. Wash thoroughly with cleaner recommended by flooring manufacturer, to manufacturer's recommendations.

B. Protection: Protect Work from damage and normal wear and tear throughout construction period, free from any indication of use or damage at time of acceptance by Owner.

3.04 SPARE PARTS

A. Leave Owner extra floor covering and base of each color and texture used on Project.

B. Amount of extra material equal to two percent of total amount of each color, pattern, and style.

- END OF SECTION -

SECTION 09680

CARPET

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Carpet.
   2. Resilient Bases.
   3. Accessories.

1.02 QUALITY ASSURANCE

A. Design Criteria:
   1. Flame Spread: 75 max.
   2. Fuel Contributed: 75 max.
   3. Smoke Developed: ASTM E84-81a, 200 max.
   4. Smoke Propagation: 0.0 to 4.0 when tested to UL 992.
   5. NBS Smoke Chamber Test: Average of all conditions 300 max. with no individual result exceeding 375.

B. Reference Standards: Comply with applicable provisions and recommendations of the CRI "The Carpet Specifier's Handbook".

1.03 SUBMITTALS

A. Furnish submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Samples: 18 in. x 27 in. sample of each color, type, and pattern with 6 in. long carpet edge strip.
   2. Shop Drawings: Submit showing layout, seam locations, and edge strip locations with direction of pattern and lay of pile indicated and details of cutouts.
   3. Manufacturer's Data.
   4. Certificates: Submit certified laboratory test reports for fire hazard classification of carpet and carpet cushion.
   5. Maintenance Instructions: Submit 2 copies for care, cleaning, maintenance, and repair.

PART 2 PRODUCTS

2.01 MATERIALS

A. Carpet - Apartments:
   1. Fiber Content: 3-ply Antron III with Static Protection.
   2. Stitches: 7 per in.
   3. Total Weight: 62.50 oz. per sq. yd.
   4. Method of Manufacture: Tufted level loop.

5. Pile Yarn Weight: 24 oz. per sq. yd. at 0.248 in. height.
6. Yarn Size: 1/10 in.
7. Primary Backing: Polypropylene.
8. Secondary Backing: Jute.
9. Acceptable Manufacturer: Lees, Chatham-Hollis, Bigalow, Armstrong, Mohawk, Trend Mills, J.P. Stevens, Wellco Carpet Co.

B. Carpet - Public Corridors:
1. Fiber Content: 3-ply Antron III with Static Protection.
2. Stitches: 8.3 per in.
3. Total Weight: 66.50 oz. per sq. yd.
4. Method of Manufacture: Tufted level loop.
5. Pile Yarn Weight: 28 oz. per sq. yd. at 0.248 in. height.
6. Yarn Size: 1/10 in.
7. Primary Backing: Polypropylene.
8. Secondary Backing: Jute.
9. Acceptable Manufacturer: Lees, Chatham-Hollis, Bigalow, Armstrong, Mohawk, Trend Mills, J.P. Stevens, Wellco Carpet Co.

C. Accessories:
1. Carpet Adhesive: Release-type as recommended by manufacturer.
2. Edge Strip: Color as selected from manufacturer's standard color range.
3. Seaming Tape: "Rubber-Loc" (Reiling), "Rug Sealz" (Naugatuck Chemical Div.).
4. All Other Materials: Manufacturer's standard for product specified.
5. Carpet Cushion:
   a. Rubberized hair and india fiber center.
   b. Moisture resisting coating on top and bottom.
   c. Weight: 56 oz. per sq. yd.
   d. Do not use in handicapped apartments.
   e. Acceptable Manufacturer: Allen Industries Model Rubberlor 56.

D. Resilient Bases:
1. Solid homogeneous vinyl toe base in continuous lengths.
2. Size: 0.080 in. ga. x 4 in. high.
3. Accessories: Provide inside and outside corners, and end stops where applicable.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate installation of carpet not to delay occupancy of building or interfere with completion of construction.

B. Examine substrates, adjoining construction, and condi-

tions under which Work is installed.

C. Do not proceed with Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:
1. Comply with manufacturer's instructions and recommendations.
2. Place seams at locations indicated on accepted shop drawings.
3. Maintain direction of pattern, texture, and lay of pile.
4. Extend carpet into closets and offsets, and under movable equipment of rooms and spaces shown or scheduled to receive carpet, including recessed covers within those spaces.
5. Provide cutouts as required for removable access covers in substrates except do not cut out for floor closer cover plates.
6. Bind edges neatly and secure to substrate.
7. Cut only 3 sides where feasible to provide carpet flap in lieu of fully removable cutout.
8. Cut openings in carpet for electrical outlets, piping, and other penetrations.
9. Maintain close tolerances so edges of carpet will be covered by plates and escutcheons.
10. Install edge strip at every location where edge of carpet is exposed to traffic, unless otherwise indicated.
11. Install in single lengths wherever possible, secured in accordance with manufacturer's directions.

B. Glue-Down Installation:
1. Install test sample to demonstrate proper adhesion and removal capability of bonding system.
2. Cut and fit sections of carpet before application of adhesive.
3. Apply adhesive in accordance with manufacturer's directions, complying with procedure demonstrated to be satisfactory by test sample.
4. Butt carpet seams and edges tightly together and cement edges of backing together with continuous bead of latex cement in accordance with manufacturer's directions.
5. Eliminate air pockets and roll to ensure uniform band over entire area.
6. Promptly remove adhesive from carpet face.

C. Resilient Bases:
1. Secure bases to surfaces with waterproof cement.
2. Make joints tight.
3. Keep top and bottom edges in firm contact with adjacent surfaces.
4. Use longest lengths possible.
5. Straight pieces less than 23 in. long not

permitted.

3.03 ADJUSTING AND CLEANING

A. Vacuum carpet with commercial vacuum, with rotating agitator or beater in nozzle.

B. Remove soil spots in accordance with manufacturer's recommendations.

C. Protect carpet from damage and soiling.

D. Use non-staining cover material for protection.

E. Tape joints in protective covering.

3.04 SPARE PARTS

A. Deliver all unused carpet and scraps larger than 2 sq. ft. in area and 12 in. wide to Owner.

B. Store where directed.

- END OF SECTION -

SECTION 09900

PAINTING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items.
   1. Primers.
   2. Finish Paints.

B. Related Work:
   1. Section 05500, Metal Fabrications.
   2. Section 06400, Architectural Woodwork.
   3. Section 08100, Metal Doors and Frames.
   4. Section 08210, Wood Doors.
   5. Section 09200, Lath and Plaster.
   6. Section 09250, Gypsum Board.
   7. Division 15, Mechanical.
   8. Division 16, Electrical.

1.02 SYSTEM DESCRIPTION

A. Performance:
   1. Refer to Drawings and schedules for extent of Work.
   2. Work includes painting and finishing interior and extrior exposed items and surfaces throughout Project, except as indicated.
   3. Surface preparation, priming, and coats of paint specified are in addition to shop priming and surface treatment specified in other Sections.
   4. Work includes field painting of exposed bare and covered pipes and ducts, including color coding, and of exposed hangers, exposed steel and iron work, and primed metal surfaces of equipment installed as part of Division 15 and 16.
   5. Do not include painting of factory finished or installer finished items, finished metal surfaces, operating parts, and labels or nameplates.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Manufacturer's Data.
   2. Colors as selected and approved for exposed interior and exterior surfaces.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Handling:
   1. Do not paint when air is dust-laden or when weather and temperature conditions are unsuitable.
   2. Do not paint exterior surfaces in damp or rainy weather.

3. Comply with manufacturer's recommendation with respect to application and drying period temperatures and application conditions.

B. Fire Protection:
1. Place materials which might constitute a fire hazard into metal containers.
2. Remove from premises at close of each days' work.
3. Take every precaution to avoid damage by fire.

C. Surface Protection:
1. Provide suitable coverings to protect surfaces not requiring painting.

D. Accessories:
1. Remove or protect items which are not to be painted and which were placed before painting.
2. Reposition or remove protection upon completion of each space.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:
1. Tint primers and undercoats to approximate shade of selected finish coat color.
2. For deep tone finish colors, use Deep Base Primers recommended by manufacturer for surface.
3. Dry Mil Thickness:
a. Comply with manufacturer's specifications.
b. If thinning of materials is performed, apply additional coats to achieve full film thickness of coats specified.
4. Color Selections:
a. If color is not listed for any specific area or item, it does not relieve Contractor of responsibility for providing colors to be selected.
b. Color selection made by Architect is to determine basic color required for surface.
c. Colors with same designation but produced from two or more sources shall match when viewed from distance of 24 in. or more.
d. Final application of colors shall match prepared samples approved by Architect.
5. Manufacturer:
a. For purpose of designating type and quality of Work, Specifications are based on products of Pratt & Lambert.
b. Products of other manufacturers shall fully match type and quality of product specified.
c. Alternate Acceptable Manufacturer: Glidden, Benjamin Moore, Pittsburgh Paints.

B. Exterior Surfaces:
1. Metal - Semi-Gloss:
a. Primer: 1 coat, Effecto Rust-Inhibit Primer.

b. Finish: 2 coats, Aqua Royal House & Trim.
2. Metal - Galvanized:
a. Primer: None.
b. Finish: 2 coats, Aqua Royal House & Trim.
3. Masonry - Satin:
a. Primer: 1 coat, Primafil 200.
b. Finish: 2 coats, Aqua Royal House & Trim.
4. Concrete - Semi-Gloss:
a. Primer: None.
b. Finish: 2 coats, Aqua Royal House & Trim.

C. Interior Surfaces:
1. Drywall - Flat:
a. Primer: None.
b. Finish: 2 coats, Pro-Hide Latex Flat.
2. Wood - Painted, Semi-Gloss:
a. Primer: 1 coat, Interior Trim Primer.
b. Finish: 2 coats, Pro-Hide Latex Satin.
3. Wood - Clear:
a. First Coat: 1 coat, Tonetic Wood Stain.
b. Sealer: 1 coat, Filler Sealer.
c. Finish Coat: 2 coats, Varmor Clear.
4. Interior Surfaces - Bathrooms and Kitchens:
a. Primer: 1 coat, Wall Primer.
b. Finish: 2 coats, Pro-Hide Latex Satin.
5. Metal - Semi-Gloss:
a. Primer: 1 coat, Interior Trim Primer.
b. Finish: 1 coat, Pro-Hide Latex Satin.

PART 3 EXECUTION

3.01 PREPARATION

A. General:
1. Prepare surfaces to receive paint; thoroughly clean off substances that may interfere with proper adhesion of paint.
2. Fill dents, cracks, hollow places, open joints, and other irregularities with filler suitable for purpose and, after setting, sand to smooth finish.
3. Prime surfaces not more than 8 hrs. after cleaning.

B. Metals:
1. Clean metal surfaces of foreign matter before priming coat is applied.
2. Remove grease and oil with cleaner manufactured for purpose.
3. Aluminum: Degrease and steam clean per SSPC-SP 1, solvent cleaning.
4. Galvanized Iron: Clean as recommended by paint manufacturer.
5. Iron and Steel: SSPC-SP 2, hand tool cleaning or SSPC SP 3, power tool cleaning.
6. Exercise care to prevent damage to shop coat.
7. Touch up abraded or marred shop coats with paint used for priming.

C. Concrete and Masonry:
   1. Paint concrete or masonry surfaces only when dry and cured.
   2. Remove grease, oil, form release agents, and efflorescence.
   3. Patch cracks and other blemishes too large to be covered by paint.

D. Plaster Work:
   1. Remove grit and loose particles and repair surface irregularities before paint is applied.
   2. Repair cracks and holes with patching plaster, properly keyed to existing plaster, and sandpaper smooth.
   3. Spackle imperfections in plaster that become visible after prime coat is applied.
   4. Make flush with adjoining surface, and spot prime with prime coat material.

E. Gypsum Drywall: Repair minor cracks and holes with finishing compound; sand smooth after drying.

F. Woodwork:
   1. General:
      a. Sandpaper woodwork to remove roughness, loose edges, slivers, or splinters and then brush to remove dust.
      b. Treat surfaces of open-grained woods with two coats of paste filler.
      c. Remove surplus filler. After primer or paste filler has dried, fill nail holes and other indentations with putty, flush with adjacent surfaces.
      d. Sand wood surfaces smooth with No. 00 sandpaper and remove dust.
   2. Painted Woodwork:
      a. Clean knots, pitch streaks, or visible sap spots of residue and treat with two coats of "Formula WP-578 Knot Sealer" (Western Pine Association).
      b. Prime millwork on all sides before installation.
   3. Varnished Woodwork: Comply with manufacturer's instructions for surface being varnished.

3.02 APPLICATION

A. Mixing:
   1. Mix materials thoroughly and strain if necessary.
   2. Do not change ready-mixed materials except according to manufacturer's instructions.

B. Application:
   1. Apply materials with care to uniform and proper film thickness.
   2. Apply with minimum brush marks.

3. Insure finishes are uniform in sheen, color, and texture.
4. Allow coats to dry thoroughly before succeeding coats are applied.

3.03 ADJUSTING AND CLEANING

A. Remove paint spots, oil or stains upon adjacent surfaces not requiring painting and leave entire job clean.

- END OF SECTION -

DIVISION 10

SPECIALTIES

SECTION 10950

MISCELLANEOUS SPECIALTIES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
1. Fire Extinguisher Cabinets.
2. Mailboxes - Locks, Directory, Letter Drop.
3. Toilet Accessories.
4. Bath Accessories.
5. Window Treatment.
6. Trash Chute.
7. Trash Compactor.
8. Closet Shelving.
9. Laundry Outlet.
10. Louvers and Screens.

B. Related Work:
1. Section 04200, Unit Masonry.
2. Section 05500, Metal Fabrications.
3. Section 09250, Gypsum Board.

1.02 QUALITY ASSURANCE

A. Reference Standards:
1. Postal Regulations:
a. Do not use less than 3 and nor more than 7 mail compartments per single frame.
b. Comply with latest regulations of USPS for materials, sizes, construction, and installation.

1.03 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
1. Shop Drawings and Product Data.
2. Manufacturer's Data.
3. Samples: For selection of color and finish only.
4. Test Data.
5. Installation Drawings.
6. Certificates of Compliance.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fire Extinguishers:
1. Pressurized Water:
a. 2-1/2, UL rated 2A, Fire Class A.
b. Polished stainless steel shell or chrome plated steel container.
c. Acceptable Manufacturer: J.L. Industries Model

Grenadier P.

2. Carbon Dioxide:
   a. 10, Fire Class BC.
   b. Enameled steel container.
   c. Acceptable Manufacturer: J.L. Industries Model Sentinel 10.

B. Fire Extinguisher Cabinets:
   1. Recessed mounted metal framed glass door, red baked enamel finish.
   2. Metal Gages: Boxes - 20 ga., Trim Frame - 18 ga., Door Panels - 16 ga., sheet steel.
   3. Trim: Rolled to minimum practicable radius, square corners.
   4. Door Frame: One-piece tubular, mitered and welded.
   5. Trim Frames: One-piece as required for installation.
   6. Joints: Welded and ground smooth.
   7. Steel Doors and Trim: Flush steel with glass.
   8. Door Hardware:
      a. Hinge: Continuous piano hinge permitting 180 deg. opening.
      b. Handles: Satin chromium finish.
      c. Catch: Self-adjusting roller latch.
   9. Acceptable Manufacturer: Watrous W-3113-E, Bobrick.

C. Mailboxes:
   1. Mailbox:
      a. General: Recessed wall mounted vertical type units.
      b. Material of Box: 0.025 in. thick terneplate.
      c. Material of Door and Exposed Frame: 0.085 in. thick extruded aluminum.
      d. Finish: Anodized aluminum color as selected by Architect.
      e. Doors swing on concealed pivots.
      f. Compartment Numbers: Laminated plastic number tabs.
   2. Locks:
      a. Provide each mail compartment door with lock, keyed different from all other locks for Project.
      b. Provide min. 1000 key changes for lock type supplied.
      c. Lock Unit: 5 pin tumbler cam type supplied with 3 change keys per lock.
   3. Directory: Aluminum extrusion for max. 42 lines to match mailbox unit and installed in same frame as mailboxes.
   4. Letter Drop:
      a. Frame: 5-7/8 in. x 13 in.
      b. Door: 4 in. x 11 in.
      c. Material: Extruded aluminum, finish to match mailboxes.
      d. Provide 1 in. high engraved legend "U.S. Mail".
   5. Acceptable Manufacturer: Bommer Industries Inc.

Model 9000 Series.

D. Toilet Accessories:
   1. Soap Dish: Hallmark 821.
   2. Toothbrush and Tumbler Holder: Hallmark 832.
   3. Robe Hook: Hallmark 881.
   4. Toilet Paper Holder: Hallmark 875.
   5. Medicine Cabinet: Kent L2024 with integral light.

E. Bath Accessories:
   1. Curtain Rod: Hallmark 4001.
   2. Towel Bar: Hallmark 894, refer to Drawings for lengths.
   3. Soap Dish: Refer to Section 09300.
   4. Grab Bars: Hallmark 352, refer to Drawings for lengths.
   5. Tilting Mirror: Hallmark 1046.

F. Roller Blinds:
   1. Fabric:
      a. Tearproof woven fiberglass coated with sun-resistant vinyl plastic, fire-retardant and fade-resistant.
      b. Color: White.
      c. Double needle stitch both hems and backstitch.
   2. Roller: Wood with heavy duty springs and positive locking mechanism.
   3. Pull: 1-1/4 in. x 5/16 in. hard maple slat, hard-braided large diameter cotton cord attached to slat with screw eye and cord clasp.
   4. Mounting: Inside brackets.

G. Trash Chute:
   1. Chute: 16 ga. galvanized steel, size as indicated on Drawings.
   2. Intakes:
      a. Size: 15 in. wide x 18 in. high.
      b. Hand operated hopper type door, self-closing, bottom-hinged with 1-1/2 hr. 250 deg. F. UL B Label.
      c. Finish: No. 304 nickel bearing stainless steel No. 3 finish.
   3. Discharge: Type G sliding discharge door, self-closing with fusible link.
   4. Vent: Full diameter vent extending min. 4 ft. above roof with metal safety cap.
   5. Sprinkler: 3/4 in. NPT sprinkler and flushing heads with 17/32 in. orifice above top intake.
   6. Acceptable Manufacturer: Midland Metalcraft, Wilkinson Chutes, Inc.

H. Trash Compactor:
   1. Top-fed unit extruding pre-compacted waste horizontally into portable receptacle.
   2. Capacity: 500 lbs. before bag removal with cylinder of compacted trash broken into 50 lb. segments.
   3. Automatic operation with manual on/off, reset, and

reverse switches.
4. Acceptable Manufacturer: Auto-Pak Model Gobbler 16.

I. Closet Shelving:
1. General:
a. Type: Wall mounted metal shelving for clothes closets, linen closets, and storage.
b. Color: White.
2. Clothes Closet and Clothes Bar:
a. Size: 12 in. wide x length detailed.
b. Mounting: End wall supports for shelf and bar, center support, backwall clip.
3. Linen Closet:
a. Size: 14 in. wide x length detailed.
b. Mounting: End wall supports.
c. Quantity: Five per closet.
4. Storage:
a. Size: 12 in. x length detailed.
b. Mounting: End wall supports, center support, backwall clip.
5. Acceptable Manufacturer: Kinkead Industries Model Float-A-Just.
6. Alternate Acceptable Manufacturer: Solar Hardware Co. Model Fast-Fit.

J. Laundry Outlet: Guy Gray Model FNWBED and CU-4.

K. Louvers:
1. General:
a. Structural Supports: Design to withstand wind load of 20 PFS min.
b. Fabricate to withstand 1000 FPM free area velocity at pressure drop of less than 0.16 in. water gage and to carry less than 0.15 oz. of water per sq. ft. of free area.
2. Heads, Sill, Jamb, and Mullions: One-piece structural members of 6063-T52 alloy, 0.064 in. thick with integral calking slot and retaining beads.
3. Mullions: Sliding interlock type with double internal drains.
4. Blade: Drainable, min. 0.064 in. thick with front lip gutter and recessed second gutter to catch and direct water to jamb and mullion drains.
5. Screen: 1/2 in. mesh, 0.063 in. dia. wire intercrimp, secured within 12 B & S gage aluminum frame.
6. Color: As selected.
7. Acceptable Manufacturer: Construction Specialties.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine substrates and adjoining surfaces before installation to ensure adjacent work has been completed.

3.02 INSTALLATION

A. General:
   1. Install specialties to manufacturer's recommendations.
   2. Do not install before completion of Work by other trades on adjacent surfaces.
   3. Coordinate requirements for cutouts and openings in wall for recessed mounted units in conjunction with Section 04200, Unit Masonry, or Section 09250, Gypsum Board.

B. Fire Extinguisher Cabinets:
   1. Comply with NFPA 10, securely fasten to structure, square and plumb, in accordance with manufacturer's instructions.

3.03 ADJUSTING AND CLEANING

A. Clean all surfaces at time of installation and before final acceptance by Owner.

B. Repair all surfaces damaged during installation.

- END OF SECTION -

DIVISION 11

EQUIPMENT

SECTION 11450

RESIDENTIAL EQUIPMENT

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
   1. Kitchen Equipment.

B. Related Work:
   1. Section 12390, Residential Casework.
   2. Division 15, Mechanical.
   3. Division 16, Electrical.

1.02 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Product Data.
   2. Shop Drawings: Rough in locations for power and plumbing.
   3. Operation and Maintenance Manuals.
   4. Warranty Certificates.

PART 2 PRODUCTS

2.01 MATERIALS

A. Kitchen Equipment:
   1. General:
      a. Color: Almond, manufacturer's standard color.
   2. Appliances:
      a. Range: Electric; General Electric Model JA S03, Hot Point Model RA 513, Sears Kenmore Model 64811, Magic Chef Model 35A-7B.
      b. Handicapped Cooktop: Sears Kenmore Series 43421, Whirlpool Model RC8400XK, Frigidaire Model RB-131J, Magic Chef Model 868.1.
      c. Handicap Unit Wall Oven: Sears Kenmore Series 42381, Whirlpool Model RB1200XK, Frigidaire Model REG-74H, Magic Chef Model 988-4CW.
      d. Hoods: Ductless; General Electric Model *****, Whirlpool Model *****, Kenmore Model *****, Magic Chef Model *****.
      e. Refrigerator: Hot Point Model CTF-15CB, Sears Kenmore Model 62411, Whirlpool Model EHT141JK, General Electric Model TBF14SB, Magic Chef Model RB12-1P.
      f. Handicap Refrigerator: Hot Point Model CSF 20EB, Sears Kenmore Model 60231, Whirlpool Model EED 191 PK, Magic Chef Model RB15-2A.

PART 3 EXECUTION

3.01 PREPARATION

A. Inspect adjoining surface and insure that all work has been completed before placement of equipment.

B. Insure rough-in work meets requirements supplied as part of shop drawings.

3.02 INSTALLATION

A. Comply with manufacturer's instructions and recommendations.

B. Coordinate final hook up to electrical and mechanical fittings and equipment.

3.03 FIELD QUALITY CONTROL

A. Test all equipment in presence of Owner's Representative before final acceptance to demonstrate proper operation of equipment.

B. Replace or repair any malfunctioning or damaged equipment.

3.04 ADJUSTING AND CLEANING

A. Clean all surfaces at time of installation and before final acceptance by Owner.

- END OF SECTION -

DIVISION 12

FURNISHINGS

SECTION 12390

RESIDENTIAL CASEWORK

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
1. Kitchen Cabinets.
2. Countertops.
3. Cabinet Hardware.
4. Bathroom Vanities.

B. Related Work:
1. Section 11450, Residential Equipment.
2. Division 15, Mechanical.

1.02 SYSTEM DESCRIPTION

A. Definitions:
1. Exposed Portions of Cabinets:
a. Include all surfaces including edges visible when doors and drawers are closed.
b. Include visible surfaces and visible edges of shelves in open cabinets or behind glass doors and underside of bottoms of cabinets over 48 in. A.F.F.
2. Semi-Exposed Portions:
a. Include surfaces behind opaque doors and drawer fronts including shelves, dividers, interior faces of cabinet ends, backs, tops and bottoms, drawer sides, backs and bottoms, and back face of doors.
b. Include underside of bottoms of cabinets be tween 2 ft.0 in. and 4 ft.0 in. from floor and flat tops 5 ft.9 in. or more above floor.
3. Concealed Portions of Cabinets:
a. Include sleepers, web frames, dust panels and other surfaces not normally visible after in stallation.
b. Include underside of bottoms of cabinets max. 2 ft.0 in. above floor.

1.03 QUALITY ASSURANCE

A. Reference Standards:
1. Kitchen Cabinet Standard:
a. ANSI A161.1.
b. NKCA Certification: Provide kitchen cabinets with NKCA Certified Cabinet seal affixed in semi-concealed location of each unit.
2. Countertop Standard:
a. ANSI A161.2
b. Field Measurements: Verify sizes and shapes of countertops before fabricating by field meas-

urements taken after base cabinets are installed.

1.04 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
   1. Product Data: Submit manufacturer's technical product data and installation instructions indicating materials, hardware, and finishes used in fabricaation of kitchen cabinets.
   2. Shop Drawings:
      a. Submit shop drawings showing location and size of each type of cabinet and countertops, accessories, materials, finishes, hardware types and locations, fillers.
      b. Include fully dimensioned plans and elevations and indicate details of anchorage to countertop and to walls.
   3. Samples:
      a. Submit fully finished samples of following items required for kitchen cabinets:
      b. Solid Wood with Transparent Finish: 3 finished samples, 3/4 in. x 6 in. x 18 in., for each species.
      c. Veneered Plywood with Transparent Finish: 3 finished samples, 12 in. sq. square, for each species and cut.
      d. Plastic Laminate: 3 samples, 12 in. sq., for each type of finish.
      e. Plywood or Particleboard with Painted Finish: 3 finished samples, 12 in. sq., for each type of finish and color.
      f. Exposed Hardware: One unit of each type and finish.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protect wood cabinets and countertops during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Handling:
   1. Do not deliver wood cabinets and countertops until painting, wet work, grinding and similar operations, which could be performed before installation of kitchen cabinets, have been completed in installation areas.
   2. Store kitchen cabinets and countertop in installation areas or, if impracticable, in areas with similar ambient conditions.

1.06 JOB CONDITIONS

A. Environmental Requirements:
   1. Conditioning:
      a. Comply with cabinet manufacturer's recommenda-

tions for temperature and humidity requirements in cabinet installation areas.

b. Do not install cabinets and countertops until required temperature and relative humidity have been stabilized and will be maintained in installation areas.

2. Maintain temperature and humidity in installation areas as required to maintain moisture content of installed cabinet work tolerance range of optimum moisture content acceptable to cabinet manufacturer, from date of installation through remainder of construction period.

PART 2 PRODUCTS

2.01 MATERIALS

A. Particleboard:
1. ANSI A208.1 matformed particleboard, Grade 1M2 with min. 40 lb. per cu. ft. density.
2. Internal Bond: 60 psi.
3. Screwholding Capacity: Min. 225 lbs. on faces and 200 lbs. on edges.

B. Plastic Laminate:
1. NEMA LD3, of thickness, type and grade designation indicated.
2. Color, Pattern, and Finish: As selected from manufacturer's standard selections.

C. Hardwood Plywood: PS 51, Grade 1 or better, of thickness, species, cut, and core construction indicated.

D. Hardwood Lumber: Clear, dry, sound, and free of defects selected from First Grade lumber (NHLA), of species indicated.

E. Hardboard: ANSI A135.4, Class 1, tempered.

F. Decorative Boards:
1. NEMA LQ1, low pressure melamine plastic laminate composite panels of thickness and type indicated.
2. Colors, Patterns, and Finishes: As selected from manufacturer's standard choices.

G. Medium Density Fiberboard: ANSI A208.2, of thickness indicated.

2.02 FABRICATION

A. Plastic Laminate Cabinets:
1. Exposed Surfacing Material of Doors, Drawer Fronts, Fixed Panels, Toeboards, and Ends: High pressure plastic laminate, 0.028 in. thick, General Purpose Type GP28.
2. Semi-Exposed Surfacing Material and Doors: High pressure plastic laminate, 0.020 in. thick, Cabinet

Liner Type CL20, in color or pattern and finish matching interior of cabinets, unless otherwise indicated.

3. Remaining Semi-Exposed Materials: Decorative boards, General Purpose Type, conforming to NEMA LQ1 with decorative faces in patterns, colors, and finish as selected from manufacturer's standard choices.
4. Concealed Materials:
   a. Any sound, dry solid lumber, plywood or particleboard or combination without defects affecting strength, utility or stability.
   b. Concealed Surfaces: Construct of decorative boards, provide decorative or cabinet liner laminate backing.
5. Core Material - Plastic Laminates: Particleboard.
6. Treatment of Exposed and SemiExposed Edges:
   a. Overhead Cabinets: Solid wood integral pull lower horizontal edge of doors.
   b. Drawers: Solid wood integral pull at top edge and matching trim at lower edge of drawer front.
   c. Lower Cabinets: Solid wood integral pull at upper horizontal edge of doors.
   d. Edge remaining portions of cabinets with high pressure plastic laminate min. 0.028 in. thick matching adjoining plastic laminate in colors or patterns and finish, unless otherwise indicated.
7. Style of Face Construction: Provide base, wall, and full height units with drawer fronts, doors and fixed panels overlaying and concealing face frames of cabinet body, unless otherwise indicated.
8. Cabinet Construction:
   a. Sides, Dividers, Tops, Bottoms, Shelves, and Stretchers: Min. 1/2 in. thick and provide stretchers at top of base cabinet.
   b. Backs: Min. 1/8 in. thick.
9. Drawer Construction:
   a. Sides, Subfronts, and Backs: Min. 3/8 in. thick.
   b. Bottoms: Min. 1/4 in. thick.
   c. Provide box type construction with front, bottom and back rabbeted in sides and secured with glue and mechanical fasteners.
10. Joinery:
    a. Rabbet backs flush into end panels and secure with concealed mechanical fasteners.
    b. Connect wall cabinet tops and bottoms and base cabinet bottoms and stretchers to ends and dividers by means of mechanical fasteners.
    c. Rabbet tops, bottoms, and backs into end panels.
11. Subbase: Min. 3/4 in. thick, of height and relationship to cabinet fronts and exposed ends as indicated.
12. Toe Board: Min. 5/8 in. thick, attached to subbase

with concealed fasteners.

B. Countertops:
   1. Exposed Surfacing Material:
      a. High pressure plastic laminate, 0.050 in. thick, General Purpose Type GP50.
      b. Postformed: 0.042 in. thick, Postforming Type PF42, where postformed countertop configuration is indicated.
   2. Substrate for Exposed Surfacing Material: Particleboard.
   3. Countertop Configuration:
      a. Front Style: Solid wood.
      b. Top Surface: Plastic laminate.
   4. Countertop Thickness: Min. 1-1/2 in. front edge, unless otherwise indicated, with substrate min. 3/4 in. thick.

C. Cabinet Hardware:
   1. General:
      a. ANSI A156.2, manufacturer's standard hardware units of type, size and finish indicated and as selected from manufacturer's standard.
   2. Hinges: Self-closing, screw mounted, concealed.
   3. Finish: As selected.

PART 3 EXECUTION

3.01 INSTALLATION:

A. General:
   1. Install cabinets plumb, level, true and straight with no distortions.
   2. Shim as required using concealed shims.
   3. Where wood kitchen cabinets abut other finished work, scribe and cut for accurate fit.
   4. Provide filler strips, scribe strips and moldings as indicated or required, and in finish to match cabinet face.

B. Attaching:
   1. Anchor cabinets securely in place with concealed fasteners.
   2. anchor into structural support members of wall construction.
   3. Comply with manufacturer's instructions for support of units.

C. Countertops:
   1. Attach securely to base units.
   2. Spline and glue joints in countertops.
   3. Provide concealed mechanical clamping of joint.
   4. Provide cutouts for fixtures and appliances as indicated.
   5. Drill pilot holes at corners before making cutouts.
   6. Smooth cut edges and coat with waterproof coating or adhesive.

D. Complete hardware installation and adjust doors and drawers for proper operation.

3.02 FIELD QUALITY CONTROL

A. Tolerances:
   1. Plumb and Level: 1/8 in. in 8 ft.
   2. Offset in Surface Alignment: Max. 1/16 in.
   3. Offset in Revealed Adjoining Surfaces: Max. 1/8 in.

3.03 CLEANING AND PROTECTION:

A. Repair or remove and replace defective work as directed upon completion of installation.

B. Clean exposed and semiexposed surfaces, touchup finish as required.

C. Remove and refinish damage or soiled areas.

D. Protection:
   1. Advise Contractor of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.
   2. Cover completed work with 4 mil polyethylene protective enclosure.
   3. Applied in manner to allow easy removal without damaging cabinets or adjoining work.
   4. Remove cover immediately before time of final acceptance.

- END OF SECTION -

DIVISION 14

CONVEYING SYSTEMS

SECTION 14200

ELEVATORS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Listing of Significant Items:
1. Elevator.

B. Related Work:
1. Section 05500, Metal Fabrications.
2. Section 09650, Resilient Flooring.
3. Division 15, Mechanical.
4. Division 16, Electrical.

1.02 SUBMITTALS

A. Provide submittals to form defined in Section 01340, Shop Drawings, Product Data, and Samples.
1. Shop Drawings.
2. Installation Details.
3. Manufacturer's Data.
4. Certificate of Compliance.

PART 2 PRODUCTS

2.01 MATERIALS

A. Elevator:
1. Control: Oil hydraulic.
2. Capacity: 1800 lb.
3. Speed: 150 fpm.
4. Operation: Selective collective.
5. Car Size: 4 ft.-10 in. x 5 ft.-3 in.
6. Travel: Seven landings.
7. Power: 480 volt, 3-phase, 60-cycle, motor; 110 volt, 1-phase, 60-cycle signals and lights.
8. Hoistway Doors: Two speed.
   a. Size: 3 ft.-0 in. x 7 ft.-0 in.
   b. Finish and Material: Baked enamel, color as selected.
9. Car:
   a. Ceiling: Suspended aluminum eggcrate.
   b. Walls: Plastic laminate, color as selected.
   c. Floor: Rubber mat, refer to Section 09650, Resilient Flooring.
   d. Front Entrance: Stainless steel.
   e. Handrail: 2 in. x 3/8 in. flat stainless steel at back.
10. Signals:
   a. Ground Floor Lobby: Terminal hall station at each bank of elevators, position indicator above each car entrance in hall, terminal floor hall direction lantern - vertical style with

chime.
b. Floor Lobbies: Intermediate hall station at each bank of elevators, intermediate floor hall direction lantern - vertical with chime.
c. Cab: Illuminated car operating station.

11. Emergency Operation: ANSI A-17.1 and State Codes.
12. Special Features:
    a. Elevator Fire Sign: ANSI A17.1, Appendix H, 5 in. wide x 8 in. high, pictograph.
    b. Handicapped Markings: ANSI handicapped recommendations.
    c. Telephone Cabinet.
    d. Audible Signal: Indicate passing or stopping at floor.
    e. Exhaust Fan.
    f. Emergency Car Lighting: Power by 6-volt rechargeable battery.
    g. Car Door Safety Device.
    h. Car Stall Protective Circuit.
    i. Emergency Return Operation: Battery operated to prevent trapping elevator occupants, rechargeable.
    j. Inspection Operation.
13. Acceptable Manufacturer: Beckwith Elevator Co.

PART 3 EXECUTION

3.01 PREPARATION

A. Insure following items are complete before starting elevator installation by elevator installer.
    1. Pits:
        a. Waterproof, designed to provide dry pit area.
        b. Floor, approximately level.
        c. Provide metal ladder on each elevator pit for pit deeper than 3 ft.-0 in.
        d. Provide two moisture-proof light fixtures and grounded duplex receptacle adjacent to elevator pit stop switch.
        e. Do not use PVC or plastic pipe in pit.
    2. Sump Provisions:
        a. Set into pump floor and cover entire sump hole area with metal cover.
        b. Do not use sump pump or sump hole to meet requirements of dry pit area.
    3. Hoistway:
        a. Provide positive venting of smoke and hot gases to outside for hoistways serving more than three floors.
        b. Locate vents in side of hoistway, min. 3 sq. ft. for each elevator car.
        c. Provide enclosures with flush surfaces with beams, floor slabs, or other building construction having max. 2 in. projection inside general line of hoistway unless top of projection is beveled at min. 75 deg. angle to horizontal.
        d. Bevel setbacks at min. 75 deg. angle to hori-

zontal.

e. Grout door entrance frames, headers, and sills solid for fire rating.

f. Grout and point up all voids, holes, slots, and other openings in hoistway to maintain fire rating and remove all nails, snap ties, form straps, and wood.

g. Glass Curtain Walls: Use laminated glass.

h. Fire Ratings: 2 hr. for floor penetrations, 1-1/2 hr. for entrances.

3.02 INSTALLATION

A. General:

1. Comply with applicable standards, manufacturer's instructions, and recommendations.
2. Comply with NFPA 70 for electrical work required during installation.
3. Coordinate structural steel for framing and metal fabrications for ladders and railings as required to comply with reviewed shop drawings as specified in Section 05500, Metal Fabrications.

B. Welded Construction:

1. Provide welded construction for installation of elevator wherever bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, or replacement of worn parts.
2. Comply with AWS standards for installation and for qualification of welding operators.

C. Sound Isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent transmission of vibrations to structure, and eliminate sources of structure-borne noise.

D. Lubrication: Lubricate operating parts of system, including ropes, guides, etc., as recommended by manufacturer.

E. Alignment:

1. Coordinate installation of hoistway entrances with installation of elevator's guide rails for accurate alignment of entrances.
2. Delay final adjustments of sills and doors until car is operable in shaft.
3. Reduce clearances to minimum, safe, workable dimensions at each landing.

F. Sills: At each floor landing, set sill unit accurately aligned, slightly above structural floor, to suit level of scheduled floor finish.

3.03 FIELD QUALITY CONTROL

A. Testing:
   1. On installation of equipment and when in full operating condition, completely test equipment to demonstrate compliance with codes, regulations, and Contract Documents.
   2. Provide necessary labor and equipment for on-site observations, testing and retesting, and cost of same as part of Work.
   3. Perform performance evaluation test with detailed check lists on elevator.

B. Correction of Defects:
   1. Make any changes necessary if tests indicate equipment is defective, at variance with specified requirements, or dangerous or objectionable in operation.
   2. Remedy any defects and pay expenses of labor and equipment of subsequent tests or on-site observations until equipment is accepted.

- END OF SECTION -

DIVISION 15

MECHANICAL

SECTION 15400

PLUMBING

PART 1 GENERAL

1.01 GENERAL

A. Attention is directed to the Bidding Documents, Contract Documents, and Division I, which are herewith made a part of this section.

B. Review all drawings, and all sections of the specifications for provisions therein affecting the work of this section.

1.02 DESCRIPTION OF WORK

A. Work to be performed under this Section without limiting the generality thereof, consists of furnishing all labor, material, equipment, scaffolding, power tools and rigging, except as otherwise specified and performing all work as necessary to fully complete the Plumbing systems shown on the accompanying Plumbing drawings and as specified hereinafter.

B. The following are included in contract under this heading:

1. Plumbing fixtures and trim.
2. Sanitary system including all soil, waste and vent piping. Sanitary drain to 10'-0" from building foundation.
3. All rainwater piping inside building including roof drains and to 10'-0" from building foundation.
4. All hot and recirculating water piping.
5. Hot water heaters.
6. Floor, roof and terrace drains.
7. Insulation.
8. All cold water piping from flanged connection in Mechanical Room.
9. Wall hydrants.
10. Waste, vent, hot and cold water connections for washing machines.
11. Trash chute wash piping and access panels.
12. All roughing and final connections to equipment furnished by Owner or other sections of these Specifications.
13. Water booster pump.
14. Temporary water as per Section 01500.

1.03 WORK BY OTHERS

A. The following related items are included under other Sections of these specifications.

1. Vent and roof drain flashings and installation of roof drains.
2. Cutting and patching.
3. Pumping and bailing.
4. Temporary water, fire protection and sanitary facilities.
5. Painting.
6. Wiring.
7. Fire extinguishers.
8. Fire protection.
9. Catch basins and manholes.
10. Foundations for equipment.
11. Concrete thrust blocks.
12. Exterior storm and sanitary systems.
13. Bathroom accessories.
14. Domestic and fire water service from street into building terminating with flange.

1.04 SHOP DRAWINGS

A. Submit shop drawings for approval in accordance with Division 1, General Requirements.

1. Plumbing fixtures and trim.
2. Drains and wall hydrants.
3. Water controllers, hot water circulator, and hot water heaters.
4. Backflow preventers and domestic water booster pump.
5. Insulation.
6. Valves.

1.05 REQUIREMENTS

A. Installation Directions: Obtain manufacturer's printed installation directions to aid in properly executing work on all major pieces of equipment.

B. Operating Instructions: Furnish manufacturer's printed operating and maintenance instructions for all major pieces of equipment.

C. Equipment Design and Installation:

1. Uniformity: Unless otherwise specified, equipment or material of same type of classification, used for same purpose, shall be the product of same manufacturer.

2. Design: Equipment and accessories not specifically described or identified by manufacturer's catalog numbers shall be designed in conformity with applicable technical standards, suitable for maximum working pressure and shall have neat and finished appearance.
3. Installation: Erect equipment in neat and workmanlike manner: align, level and adjust for satisfactory operation. Install so that connecting and disconnecting of piping and accessories can be made readily and so that all parts are easily accessible for inspection, removal, operation, maintenance and repair. Minor deviation for indicated arrangements may be made as approved.

D. Protection of Equipment and Materials: Responsibility for care and protection of all materials and mechanical work rests with the Contractor at all times until it has been tested and accepted.

E. Motor Starters, Control Equipment and Motors:

1. The Contractor shall furnish motors and motor starting equipment for each piece of mechanical equipment requiring same, unless otherwise specified.
2. All electrical controls shall conform to the standard requirements of N.E.M.A. and N.E.C.

1.06 FEES, PERMITS AND LICENSES

A. The Contractor shall apply, obtain and pay for all inspection permits, certificates of inspection, and license fees in connection with this work,and shall deliver same to Owner at the completion of the work.

1.07 CODES AND REGULATIONS

A. All work shall be done in accordance with the best practice of the trade and in strict accordance with the rules and regulations of the Commonwealth of Massachusetts and all other authorities having jurisdiction.

1.08 CLEANING

A. The work area, including any storage areas, shall be kept free from accumulation of waste material, dirt and rubbish. At the completion of the work, the Contractor shall remove all dirt and debris caused by this work at the site and shall remove from the premises all his tools, scaffolding, equipment, crating and shipping containers, and materials belonging to him, leaving the premises, so far as his work is concerned, broom cleaned in a condition satisfactory to the Architect.

1.09 TESTING

A. The entire new plumbing systems shall be tested by the Plumbing Contractor in the presence of the Architect or his representative and the Plumbing inspector, having jurisdiction after completion of roughing and before concealing any section from view. Each section may be tested separately, if desired and if permitted by the Plumbing Inspector.

1.10 GUARANTEE

A. All equipment, labor, and materials furnished under this section of the specifications shall be guaranteed for a period of one (1) year from the date of final acceptance thereof against defective materials, manufacturer's design and workmanship. Materials and/or equipment found defective shall be replaced with new materials and/or equipment at the Contractor's expense. The Contractor shall guarantee all elements of the system are of sufficient capacity to meet the performance requirements set forth herein. Upon receipt of notice from the Owner or Architect of any failure during the guarantee period, the defect shall be remedied promptly by and at the expense of the Contractor.

1.11 SCAFFOLDING, RIGGING AND HOISTING

A. The Contractor shall provide scaffolding, rigging and hoisting either by arranging with appropriate Contractor for the use of his equipment providing the necessary equipment for his work. This Contractor's bid must carry this expense at time of bidding.

1.12 RECORD DRAWINGS

A. Sub-Contractor shall maintain at the site a set of drawings on which shall be accurately shown the actual installation of all work under his section, indicating thereon any variation from the contract drawings including changes in sizes, location and dimensions.

1.13 COORDINATION OF TRADES

A. This Sub-Contractor shall give full cooperation to other trades and to the General Contractor and shall furnish in writing with copies to Architect any information necessary to permit the work of all trades to be installed satisfactorily and with least possible interference or delay.

1.14 TEMPORARY OPENING

A. This Sub-Contractor shall ascertain from his examination of the Architectural drawings, whether any special temporary openings in the building will be required for the admission of apparatus furnished under this sub contract, and he shall notify the Architect and General Contractor accordingly.

1.15 ACCESSIBILITY

A. All work shall be installed, so that all parts requiring inspection, operation, maintenance and repair are readily accessible.

1.16 PROTECTION

A. This Sub-Contractor shall be responsible for the maintenance and protection of all equipment, materials and tools supplied by him and stored and installed on the job site, from loss or damage of all causes until final acceptance by the Owner. He shall be responsible for the protection of any finished work of other trades from damage or defacement by his operations and must remedy any such injury at his own expense.

PART 2 MATERIALS & PRODUCTS

2.01 GENERAL

A. All materials, fixtures and equipment shall be new without imperfections and shall be furnished, delivered, erected, connected and finished in every detail. Whereever possible, all trim, accessories and parts shall be of the same manufacturer as the related equipment and fixtures.

B. Drawings and specifications are intended to supplement and explain each other. Materials not specifically mentioned in the specifications shall be as indicated on the drawings. Where no specific kind of quality of material is given, a first-class standard article, as approved in writing by the Architect shall be furnished.

2.02 SANITARY AND RAINWATER PIPING - GENERAL

A. The Plumbing Sub-Contractor shall furnish and install, substantially as indicated on the drawings, soil, wastes, drains, vents from all fixtures. All piping shall be run concealed.

B. The sanitary and rain water drainage system of the building shall run to points shown on the Plumbing drawings. Piping shall be run in a workmanlike manner, straight, and as nearly as possible in accordance with the drawings. Sanitary piping shall pitch one-eighth (1/8") of an inch per foot, minimum unless otherwise noted.

2.03 SANITARY AND RAIN WATER - MATERIALS

A. The entire sanitary drainage and rainwater system except as shown or specified otherwise, shall be constructed of no hub service weight cast iron pipe and fittings. Underground sanitary and rain water shall be bell and spigot service weight soil pipe.

B. Short branches to fixtures may be Type "M" copper tubing with drainage pattern sweat fittings, if approved by local inspector.

C. Vents two (2") inches and smaller may be galvanized steel pipe with black or galvanized cast iron fittings. Vents larger than two (2") inches shall be cast iron. Waste piping two (2") inches and smaller type "M" copper.

2.04 SANITARY AND RAINWATER - JOINTS

A. Joints in cast iron piping above ground shall be made with approved M-G cast iron clamp, and shield assemblies conforming to Cast Iron Soil Pipe Institute Standards or approved no hub clamp-on joints.

B. Screwed joints shall be made up with good grade pipe joint compound suitable for use with the liquid or gas conducted by the pipe. Compound shall be applied to male threads only. All threads shall be clean and pipe reamed to remove any burrs before assembling. Caulking of threads will not be permitted.

2.05 SANITARY AND RAINWATER DRAINAGE - HANGERS

A. Vertical stacks of all soil, waste, vent and rain water piping throughout the building shall be securely fastened and supported at each floor, ceiling, and roof by means of heavy wrought iron supports, or riser clamps firmly attached to the structure and to the pipe. The foot of each stack shall be firmly supported.

B. All horizontal runs of soil, waste, vent and rain water piping shall be supported by Carpenter and Patterson - Fig. 1-A band hangers with round iron rod and a Fig. 650 inserts or machine threaded lag end rods in the structure. Hangers for piping smaller than four (4") inches shall have three-eighths (3/8") inch rods. Four (4") inches and larger shall have one-half (1/2") inch rods. Soil, waste and rain water piping shall be supported every five (5') feet; vent piping - ten (10') feet.

C. Where the weight of piping or other apparatus makes it impractical to support same from the ceiling, flanged pipe standards shall be installed to support the weight of piping, valves, fittings and equipment from the floor.

2.06 SANITARY AND RAIN WATER DRAINAGE - CLEANOUTS

A. Cleanouts shall be installed where called for by the Plumbing rules and where shown on the Plumbing drawings. For cast iron piping they shall be "Boston Regulation" with iron bodies and brass covers.

B. Where cleanouts occur under the floors in unexcavated portions, they shall be brought up flush with the floor and fitted with a cover equal to Smith #4930 with polished brass top, Josam or Zurn.

C. Cleanouts shall be of the same size as the pipes they serve, up to four (4") inches. They shall be placed so as to be readily accessible, being extended if necessary. Cleanouts shall be installed at the base of all stacks at changes in direction, and at least every fifty (50) feet in long runs of piping.

D. Cleanouts at base of all stacks concealed in partitions or furred spaces shall be fitted with Smith 4710, Zurn, Josam or equal, polished brass covers.

2.07 SANITARY DRAINAGE - SPECIAL WASTES

A. Connections between soil lines and water closets shall be made with cast iron bends or starts, Water closets shall be properly connected to bends or starts with non-hardening compound joints. Rubber gaskets will not be permitted.

2.08 SANITARY DRAINAGE - VENTS AND TRAPS

A. All vent pipes shall be pitched toward the drain pipe they serve. The running long horizontal vents, pocketed, and bow vents shall be avoided, if possible.

B. All vents smaller than four (4") inches shall be increased to four (4") inches before passing through the roof or as shown on drawings.

C. All fixtures and drains are to be separately trapped and shall be vented as shown on the drawings or required by the Plumbing Inspector. Vents may be connected together, if found desirable, but not less than six (6") inches above the highest fixture. No vents shall pass through the roof, except in positions approved.

2.09 WATER PIPING - MATERIALS

A. All cold and hot water piping for the Plumbing in the buildings, except as otherwise specified, shall be type "M" hard copper tubing with wrought, sweat joint fittings. Solder shall be 95-5 (95 percent tin, 5% antimony). All piping above ground shall be concealed, if possible. Wherever piping is exposed in toilet rooms it shall be chromium plated.

2.10 WATER PIPING - HANGERS

A. All water piping shall be supported at intervals of not over eight (8') feet by malleable split ring hangers similar to Carpenter and Patterson Fig. 81, round three-eighths (3/8") inch iron rods and Fig. 650 inserts or machine threaded lag end rods in the structure. Hangers shall be finished to match the pipe they serve. Hangers shall be Carpenter and Patterson, Grinnell, Calco or equal.

B. Where inserts cannot be used, furnish and install expansion shields equal to "Phillips" or "Bulldog", drilled into structure. Explosive powered studs will not be permitted.

2.11 WATER PIPING - VALVES

A. Valves and drips shall be installed on each riser where it leaves the main. They shall be installed on wall hydrants, where shown and where directed. Each fixture shall have a stop valve on each supply line directly under and in the same room as the fixture it serves.

B. Where valves or traps are concealed in walls or ceilings access panels shall be furnished by wallboard or ceiling Sub-Contractors.

C. Valves on water lines one (1") inch and over shall be bronze body, wedge disc for 300# working pressure.

D. Check valves shall be horizontal swing type, 300# working pressure, bronze body. Stops (on wall hydrants only) shall be compression type, bronze body, with stuffing box for 300# working pressure.

E. Valves shall be screwed or sweat and to suit the pipe on which they are installed.

F. Valves shall be Nibco, Walworth Co., or Fairbanks Co., or approved equal. All valves shall be of one (1) manufacture.

2.12 WATER PIPING - INSTALLATION

A. Plumbing Sub-Contractor shall run cold and hot water piping to all fixtures requiring same. He shall do all roughing and final connections.

B. Piping shall be run substantially as shown on the drawings and shall be straight, true and installed in a workmanlike manner. All piping shall be pitched sufficiently that it will drain and shall have draw-offs at all low points.

C. Supplies to individual fixtures or to batteries shall be equipped with an air chamber at least twenty (20) pipe diameters long and as large as the pipe it serves. It shall be placed as near as practicable to the fixture it serves. In lieu of chambers, shock absorbers or hammer arrestors may be provided where shown on drawings.

D. Where branches are taken from mains,provide swing joints to allow for movement and expansion.

2.13 SLEEVES

A. The Plumbing Sub-Contractor shall keep himself informed as to the location of pipes, etc., and the openings he will require for his work and shall furnish and set all sleeves, angles, frames, hangers, inserts, etc., so that they may be built in place.

B. All wrought iron, steel, brass, copper piping passing through floors or ceilings shall have plastic sleeves two (2) sizes larger than the nominal diameter of the pipe. Sleeves for these pipes where they pass through walls or partitions shall be twenty-four (24) gauge galvanized iron. At the sleeves in finished rooms the piping shall be fitted with a C.P. escutcheon with securing device.

2.14 INSULATION

A. All insulation shall be applied by a competent Contractor using only skilled labor. Only whole sections shall be used and covering must fit the piping tightly.

B. All hot water and circulating piping, except horizontal piping in pipe chases, shall be insulated with one (1") inch low pressure fiberglass with vapor barrier jacket unless as noted on plans.

C. All horizontal cold water piping, except horizontal piping in pipe chases, shall be insulated with one-half (1/2") inch fiberglass with vapor barrier jacket unless as noted on plans.

D. Fittings shall be insulated with premoulded one (1) piece PVC as made by Zeston. Insulation shall be installed in accordance with manufacturer's instructions.

E. All horizontal rainwater piping shall be insulated with one (1") inch fiberglass covering with vapor barrier jacket. Body of roof drains shall be insulated with vapor barrier insulation.

F. All exposed drain pipes and hot and cold water piping shall be insulated in a neat workmanlike manner. For handicapped fixtures only.

2.15 HOT WATER STORAGE HEATERS

A. For complete description see drawings.

2.16 FLOOR AND ROOF DRAINS

A. For complete description see drawings.

2.17 PLUMBING FIXTURES

A. Plumbing Sub-Contractor shall furnish and install all fixtures and equipment shown on Plumbing plans and hereinafter specified, except as specified otherwise.

B. The number and arrangement of the Plumbing fixtures is shown on the drawings. The plate numbers and manufacturer's names given below are for the purpose of establishing size, grade, and trim of fixtures. Fixtures of other manufacturers which are equal, in the opinion of the Architect, to those specified will be considered. Plumbing fixtures shall be equal to American Standard, Eljer or equal.

C. The Plumbing Sub-Contractor must obtain written approval of the list of fixtures before placing order for same.

D. It is the intention of this contract that all parts constituting the various fixtures shall be of one (1) manufacturer as nearly as possible.

E. All exposed fixture brass goods shall be heavy chromium plated.

F. All fixtures shall be best quality, free from any defects.

G. Each fixture shall be fitted with a stop valve on each supply line.

H. Plumbing Sub-Contractor shall furnish all supports, brackets, bolts, etc., for proper installation of any fixture, requiring supports. They shall be in accordance with the manufacturer's recommendations and if necessary, shall be built into place as the building progresses. This Sub-Contractor shall be held responsible for the stability and proper support of all Plumbing fixtures. They shall be of the following description:

1. P-1 Water Closet

   2128.115 Water Saver Yorkville floor mounted back outlet, round front siphon jet close coupled Church solid plastic round closed front 310 B; 3/8" flexible supply with stop chrome plated.

2. P-2 Lavatory

   5608.039 Oval Contura countertop Duramel self rimming 20" x 17 faucet holes on 4" centers.
   Reliant 2385.049 single lever faucet 2½ G.P.M. flow restrictor pop-up drain and aerator.
   Pair of 3/8" angle stops and supplies chrome plated; cast brass "P" trap with cleanout chrome plated.

3. P-3 Bathtub

   0134.130 and 0136.135 Solar 5' enameled steel bathtub, slip-resistant surface above floor installation.
   Symmons 96-2-3X pressure balance bath and shower fitting.
   Pop-up bath drain and overflow-cast brass 17 gauge - direct lift. Pop-up mechanism.

4. P-4 Kitchen Sink

   Dayton 25" x 22" stainless steel sink, 20 gauge, 3 faucet hole. Reliant 4205.074 single handle faucet with hose spray pair 3/8" angle stops and risers to suit chrome plated 1½" cast brass "P" trap with cleanout chrome plated.

5. P-5 Disposer

Insinkerator Model Badger V 1/2 horsepower continuous feed operation 115 Volt.

6. P-6 Water Closet (H.C.)

2130.151 Yorkville water saver vitreous china toilet floor mounted back outlet, siphon jet elongated close coupled
Church solid plastic elongated closed front 380 TL, 3/8" flexible supply with stop chrome plated.

7. P-7 Lavatory (H.C.)

5608.039 Oval Contura countertop Duramel self-rimming 20" x 17" faucet holes on 4" centers.
Reliant 2385.078 single lever faucet less pop-up; cast brass grid strainer with offset drain assembly; cast brass "P" trap with cleanout; pair of 3/8" angle stops and supplies. Exposed drain pipes and hot water piping shall be recessed insulated or guarded.

8. Bathtub (H.C.) - Bathtub Handicapped

0134.130 and 0136.135 Solar 5' enameled steel bathtub, above floor slip-resistant surface. Symmons S-96-401-X-3 pressure balance bath and shower fitting.
Pop-up drain and overflow-cast brass 17 gauge direct lift pop-up mechanism.

9. P-9 Kitchen Sink (H.C.)

Elkay GECR 2522 stainless steel sink with outlet to right or left rear as required.
Reliant 4205.074 single handle faucet with hose spray; pair of 3/8" angle stops and recess to suit chrome plated; 1½" cast brass "P" trap with cleanout chrome plated.

10. P-10 Water Closet

2122.453 Cadet Water saver vitreous china round front siphon jet action close coupled tank.
Church solid plastic round closed front 3 D, 3/8" flexible supply with stop chrome plated.

11. P-11 Lavatory

0321.026 Declyn vitreous china 4" centers with wall hanger 19" x 17" Reliant 2385.049 single lever faucet with pop-up drain and aerator. Pair of 3/8" angle stops and supplies chrome plated; cast brass "P" trap with cleanout chrome plated.

12. P-12 Bath Tub

0135.137/0137.133 Salem recess Bath enameled steel 60" slip resistant surface, and resisting Symmons 96-2-3X pressure balance bath and shower fitting. Pop-up Bath drain and overflow cast brass 17 gauge direct lift pop-up mechanism.

2.18 DOMESTIC WATER BOOSTER SYSTEMS

A. Furnish a packaged domestic water booster system as manufactured by Kimball-Jones Company or approved equal. The system shall be designed to deliver 130 G.P.M. at 65 P.S.I. with 50 P.S.I. suction pressure

B. The system shall include two centrifugal pumps. Each pump shall be rated at 100 G.P.M. at a total head of 50 feet. These shall be bronzed fitted pumps with mechanical seals with NI-Resist seats and stainless steel parts and shaft sleeves. Each pump shall be furnished with not less than a 2 H.P. dripproof motor wound for 208 Volt, 3 Phase, 60 Cycle current.

C. On the discharge of each pump furnish a combination pressure reduction and check valve. The valves shall be of the balanced seat design with no pilot valves, needle valves or fixed orifices required. The valves shall have bronze bodies and trim and shall be not less than 2½".

D. In the suction and discharge piping to each pump provide 3" diameter shut off valves. These shall be furnished with cast iron bodies, BUNA-N seats and 316 stainless disc and stems. All piping in the system shall be of type "L" copper with 4" flanged headers on the inlet to and discharge from the system. The system shall be mounted on a heavy 3" structural steel base. Provide 3½" diameter inlet and outlet pressure gauges with gauge cocks. Provide pressure gauges for the discharge of each pump. Provide a temperature sensor for each pump.

E. For control of the system furnish a N.E.M.A. 1 control panel mounted on the structural base. The panel shall include:

1 - Disconnect switch.
2 - Magnetic across the line starters with overloads in each phase.
2 - Hand-Off-Automatic selector switches.
1 - Control transformer.
1 - Transfer switch to alternate the lead pump.
1 - Pressure switch with time delay to start the stand-by pump.
1 - Pressure switch with time delay to shut the system down on high suction pressure.
1 - Set relays to shut system down on no flow.

F. The system shall be furnished completely piped and wired so that only inlet and outlet piping connections are required along with a power supply to the panel. It shall be hydrostatically tested to 150 P.S.I.

PART 3 - EXECUTION

3.01 GENERAL

A. The Plumbing Sub-Contractor shall refer to the Plumbing drawings and the Architectural floor plans and details for a full comprehension of the extent and detail of the work to be performed. The drawings are intended to be supplementary to the specifications and any work indicated, mentioned or implied in either is to be considered as specified in both.

B. All work shown on the drawing is intended to be approximately correct to the scale of the drawing, but figured dimensions and detail drawings are in all cases to assume precedence over them.

C. Work installed by the Plumbing Sub-Contractor which interferes with or modifies the Architectural design as shown on the contract drawings shall be changed as directed by the Architect and all costs incident to such changes shall be paid by the Plumbing Contractor.

D. The Plumbing Sub-Contractor shall maintain at the site a set of drawings on which shall be accurately shown the actual installation of all work under this section, indicating thereon any variations from the contract drawings, including changes in sizes, locations and dimensions.

E. All work, fixtures and materials shall be protected at all times. The Plumbing Contractor shall make good all damage caused either directly or indirectly by his workmen. All pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water or chemical injury.

F. All work shall be done by skilled workmen, in accordance with the best practices of the trade and to the satisfaction of the Architect.

3.02 SLEEVES

A. the Plumbing Contractor shall set all sleeves, angles, frames, hangers, inserts, etc., so that they may be built in place.

B. All piping passing through floor or ceilings shall have galvanized steel sleeves two (2) sizes larger than the nominal diameter of the pipe. Sleeves for pipes where they pass through walls or partitions shall be galvanized steel I.P.S.

C. Cast iron pipe shall, where possible, be installed before walls and floors are constructed and built in place; otherwise, galvanized steel sleeves shall be temporarily set for them and they shall be grouted in after installation.

D. Every precaution shall be taken to place sleeves for all pipes before construction and the cutting of the structure is to be avoided, if possible. Any cutting and patching due to the neglect or oversight of the Plumbing Contractor in carrying out these instructions will be done at his expense.

3.03 PIPE JOINTS

A. All screwed pipe joints shall have I.P.S. threads, and shall be made up with red lead and graphite ground in linseed oil applied to male threads only. All thread on pipe shall be full and clean cut.

B. Joints for hub-and-spigot cast iron soil pipe shall be packed with picked oakum and caulked with molten pig lead. Twelve (12) ounces of fine soft lead shall be used for each joint for each inch in diameter of the pipe.

C. Joints in no-hub cast iron piping shall be made with approved cast iron M-G clamp or approved no hub clamp on joints.

D. Joints for hub-and-spigot cast iron water pipe shall be packed with braided sterilized hemp which shall be handled on the job with reasonable care to avoid contamination and shall be dry when used. Twelve (12) ounces of fine soft lead shall be used for each joint for each inch in diameter of the pipe.

E. Joints between cast iron and steel pipe shall be made up by screwing a half (1/2) coupling on the letter to form spigot head, then make a caulked joint as specified for cast iron pipe. Joints between copper and cast iron or steel shall be accomplished with suitable adapters.

F. Soldered joints on water and waste piping shall be made up using 95-5 tin antimony solder, conforming to Federal Spec. QQ-S-571c, and joint shall be filled the full length of the socket.

3.04 ACCESS PANELS

A. The Plumbing Sub-Contractor, shall provide information for the location of access panels for all concealed valves, cleanouts, traps, controls and other plumbing items requiring access in general construction for future maintenance.

3.05 PLUMBING TESTS

A. The entire sanitary systems shall be tested by the Plumbing Sub-Contractor in the presence of the Architect or his representative and the Plumbing Inspector having jurisdiction after completion of roughing and before concealing any section from view. Each section or stack may be tested separately, if desired and if permitted by the Plumbing Inspector.

B. Test may be made by filling systems with water so that all piping being tested will be subject to a minimum pressure equal to a ten (10') foot head of water.

C. In the event that weather conditions do not permit a water test, an air test may be made subject to the approval of the Architect and the Plumbing Inspector.

D. At the completion of the work the Plumbing Sub-Contractor, in the presence of the Architect, shall operate each fixture and piece of equipment to detect defects in material and workmanship. Said fixtures and equipment shall operate with no undue noise or water hammer, and shall be made satisfactory to the Architect.

E. All cold and hot water piping shall be tested before being concealed and before fixtures are installed, to a hydrostatic pressure of one hundred fifty (150) pounds per square inch and proved tight at this pressure.

F. Test pressure shall be held for at least one-half (1/2) hour with no drop during that time.

3.06 STERILIZATION

A. The entire potable water system shall be thoroughly sterilized with a solution containing not less than fifty (50) parts per million of available chlorine. The chlorinating material shall be either liquid chlorine conforming to the requirements of Federal Specification O-B-441, Grade D. The sterilizing solution shall be allowed to remain in the system for a period of eight (8) hours, during which time all valves and faucets shall be opened and closed several times. After sterilization, the solution shall be flushed from the system with clean water until the residual chlorine content is not greater than 0.2 parts per million. Sterilization of the potable water system shall be accomplished in a manner satisfactory to the local Board of Health.

SECTION 15500

FIRE PROTECTION

PART 1 GENERAL

1.01 GENERAL

A. Attention is directed to the Bidding Documents, Contract Documents, and Division 1, which are herewith made a part of this section.

B. Review all drawings, and all sections of the specifications for provisions therein affecting the work of this section.

1.02 DESCRIPTION OF WORK

A. Furnish and install the following items required to complete this work of this SECTION as shown on the drawings and specified herein. This consists of furnishing all materials, equipment, labor, transportation facilities, and all operations and adjustments required for the complete and operating installation of the Plumbing work and all items incidental thereto, including testing. This includes the following:

1. The completed Fire Protection System shall consist of fire service, standpipes, sprinklers and accessories, which shall be left in first class operating condition.
2. This Sub-Contractor shall furnish and install a complete system of Fire Protection (standpipes, sprinklers, etc.) from flange connection left by Site Contractor.
3. This Sub-Contractor shall prepare shop drawings as indicated in paragraph 1.04.
4. Water flow indicators and supervisory switches.

1.03 RELATED WORK UNDER OTHER SECTIONS

A. Electric wiring.

B. Cutting and patching.

C. Painting.

D. Excavation and backfill.

E. Concrete work.

F. Access panels.

G. Fire line into building with blind flange.

1.04 SHOP DRAWINGS

A. This Sub-Contractor shall submit to the Architect within thirty (30) days of the award of the Sprinkler contract, six (6) copies of shop drawings and in addition pertinent data for the following equipment, showing sizes, capacities, grade, name of manufacturer, motor horsepower, etc.

1. Sprinkler heads and accessories.

B. All drawings and cuts shall be submitted at one time.

C. Shop drawings shall be coordinated with mechanical layouts (i.e., Plumbing, Electrical, Heating) and the building construction drawings.

D. Submit shop drawings for approval by the Engineer prior to submission to Insurance Company for approval.

E. Upon final approval of shop drawings, six (6) complete sets bearing stamp of Underwriters' and local building and/or fire departments approval, shall be submitted to the Architect.

1.05 MANUFACTURER'S NAMES

A. In addition to the above shop drawings he shall submit for approval, at the same time as the drawings, seven (7) copies of a list of the manufacturer's nmes for the following equipment:

1. Pipe and fittings.
2. Valves, fire pump, jockey pump and motor control.
3. Hangers.

B. This Sub-Contractor shall assume the cost of the entire responsibility for any changes in the work which may be occasioned by the approval of materials and/or equipment other than those specified.

1.06 CODES, ORDINANCES AND PERMITS

A. The Fire Protection work shall be performed in harmony with the other work in the building and at such times as not to interfere with or hold back the other trades in an unwarranted manner.

B. The Fire Protection work shall be installed in accordance with the requirements of N.F.P.A. Pamphlet 13 and 14 and local building and/or fire departments.

C. This Sub-Contractor shall file required notices and plans and shall secure all necessary permits for his work.

1.07 DAMAGE TO OTHER WORK

A. This Sub-Contractor shall be held responsible for and shall pay for all damage to other work caused by his work or workmen. Repairing of such damage shall be done by the General Contractor or Contractors who installed the work, and as directed by the Architect.

1.08 OPERATING INSTRUCTIONS

A. At the completion of the work, this Sub-Contractor shall instruct such persons as the Architect may designate regarding the care and use of the systems specified under "Fire Protection" and all apparatus pertaining thereto.

1.09 CLEAN-UP

A. This Sub-Contractor shall clear away all debris, surplus materials and so forth, resulting from his work or operations, leaving the job and equipment furnished under this Section in a clean, first-class condition. All debris shall be removed and the building left broom clean.

1.10 GUARANTEE

A. Before the work is finally accepted this Sub-Contractor shall give the Architect a written guarantee to make good to the satisfaction of the Architect, any defect in materials or workmanship which shall become apparent during the period of one (1) year from the completion and acceptance by the Architect.

PART 3 PRODUCTS & MATERIALS

2.01 MATERIALS

A. Pipe and fittings shall be steel, Schedule 40, except as otherwise noted. Fitting shall be cast iron threaded or flanged sprinkler type designed for working pressure of 300 p.s.i. Thin wall piping may be used, if code approved.

B. Unions shall be three hundred pound malleable iron ground joint, screwed, with brass to iron seat.

C. Valves shall be three hundred lb. test and outside screw and yoke type.

D. Hangers and Supports.

1. Properly support piping inside building by approved type hangers and supports, to secure piping in place, to maintain required pitch of lines, to prevent vibration, and arranged to provide for expansion and contraction. Hangers and supports; ample size and weight to carry pipe and its contents.
2. Support horizontal piping at least every ten (10') feet. Branches: Separate supports and no branch thirty (30") inches or longer without support.

2.02 SLEEVES AND ESCUTCHEONS

A. Where pipes pass through masonry walls, floor or ceilings, steel pipe sleeves, two (2) sizes larger than the pipe passing through shall be used. Sleeves shall be furnished and set in position by this Contractor.

B. Chrome plated escutcheons shall be installed around all exposed pipe passing through a finished floor, wall or ceiling.

C. Space between pipe and sleeves to be filled with fiberglass or rockwool bats and sealed off with chrome plated escutcheon plates in all occupied areas.

2.03 SPRINKLER HEADS

A. Heads shall be pendant type Viking Model "C" brass Grinnell, or Automatic.

2.04 SPRINKLER CABINET

A. Provide enameled steel cabinet containing twelve (12) extra sprinkler heads of each type, including heads of each temperature rating used, and sprihkler head wrench.

2.05 WATER MOTOR GONG

A. Gong shall be adjustable type Viking Model #D2, Grinnel, Automatic. Gong shall have aluminum hood and mounting bracket.

2.06 ELECTRIC ALARM BELL

A. Bell shall be eight (8") inches in diameter, 12 Volt, Weatherproof, Viking Model BH-1003-8' with transformer; Grinnel, or Automatic.

2.07 FIRE DEPARTMENT VALVE

A. Valves on fire lines, shall be the O.S.&Y. type. Two and one-half (2½") inch fire department valves shall be U.L. and F.M. approved angle valves with rough brass bodies and satin trim with 2-1/2" inlet and 2-1/2" outlet with 2-1/2 x 1-1/2" reducer with threads of type suitable for local fire department. Include 1-1/2" cap and chain.

2.08 FIRE DEPARTMENT CONNECTION

A. Siamese connections shall be Underwriters' approved type and each connection shall be provided with chedk valve, automatic drip valve, back connection and an O.S.&Y. gate valve. Connections shall be equipped with threads to match the local fire department standard hose coupling.

2.09 WATER FLOW INDICATOR

A. Furnish and install Vane type water flow detector Notifier Series (WFD) T or approved equal. Detector switch mechanisms shall incorporate an instantly recycling pneumatic retard element with an adjustable range of 0 to 70 seconds. Switches shall have a minimum rated capacity .25 amps., 24 Volt D.C. and shall be actuated by a polyethylene Vane extending into the water way of the piping. Detectors shall be weatherproof dust tight construction and shall provide a one-half (1/2") inch conduit entrance and shall be finished in red baked enamel. Vane type water flow detectors shall be Underwriters' Laboratories listed and F.M. approved.

B. Provide pressure reducing valve before valve of pressure exceeds 125 P:S.I.G.

2.10 SUPERVISORY SWITCHES

A. Furnish and install supervisory tamper switch on all valves on inlet side of flow switches and all valves. Switch shall be Notifier Series NGV for O.S.&Y. valves. Underwriters' Laboratories listed and Factory Mutual approved.

2.11 FIRE DEPARTMENT VALVES

A. Furnish Sierra Fig. V6LRS 2½" U.L. listed 300 PSI pressure restricting brass angle valves with B27 2½" x 1½" brass reducer and B23 brass cap and chain. All threads to meet fire department requirements.

2.12 SIAMESE

A. Furnish Sierra S367 flush polished brass siamese 6" x 2½" x 2½" x 2½" with bronze three way body. Plate shall be marked "AUTO SPR" Standpipe.

2.13 ROOF MANIFOLD

A. Furnish Sierra or equal SMH24 horizontal roof manifold 2½ x 2½ x 4 brass construction with 2½" angle valves with caps and chains.

2.14 FIRE AND JOCKEY PUMPS

A. Furnish and install an automatic Underwriters' Listed and Factory Mutual Approved electric motor driven fire pump. The unit shall be furnished in accordance with N.F.P.A. Pamphlet No. 20. It shall be rated to deliver 750 G.P.M. at a total head of 104 feet. Equal to Peerless Model 5AF-13. It shall also deliver not less than 150% of rated capacity at not less than 65% of rated head. Shut off pressure shall not exceed 120% of rated head.

B. The pump shall be a horizontal split case, double suction pump furnished in bronze fitted cast iron construction. Pump shall have steel shaft and bronze shaft sleeves. Shaft sleeves shall have integral impeller units with the nuts securing the impeller inside the pump casting. Bearing brackets shall be cast integral with the lower case with double ros, angular contact out board bearings and single row inboard bearings. Packing glands shall be of the split interlocking type made of bronze with steel bolts with bronze nuts. Case rings shall be bronze pinned to the casing and shall be angle type.

C. Pump and driver shall be mounted on a common base plate and connected through a flexible coupling to its driver. The driver shall be an electric motor of the dripproof type, wound for 208 Volt, 3 Phase, cycle current.

C. Locked rotor current shall not exceed the values specified in N.F.P.A. pamphlet #20. Bearing shall be anti-friction ball type and the motor shall be not less than 30 H.P.

D. Furnish a U.L. labelled and approved fire pump controller which shall be completely assembled, wired and tested at the factory and the assembly shall be specifically approved for fire pump purposes. The controller shall be marked "Fire Pump Controller". All equipment shall be enclosed in one approved drip-tight enclosure. The controller shall be the combined manual and automatic type incorporating the following:

1. Disconnect switch - externally operable, quick break type.
2. Circuit breaker - time delay type with trips in all phases set for 300% of the motor full - load current.
3. Motor starter - across-the-line type capable of being energized automatically through the pressure switch or manually by means of an externally operable handle.
4. Pressure swith set to cut in at 100 p.s.i.g. and out at 110 p.s.i.g.
5. Running period timer - set to keep motor in operation, when started automatically, for a period not to exceed seven (7) minutes.
6. Pilot lamp - to indicate circuit breaker closed and power available.
7. Ammeter test link and voltmeter test grade.
8. Alarm relay - to energize an audible or visible alarm through and independent source of power to indicate circuit breaker open or power failure.
9. Means shall be provided on the controller to operate an alarm contact continuously while the pump is running.

E. Furnish with the fire pump controller an automatic and manual built-in emergency transfer switch specifically approved for fire pump service. All interwiring between the fire pump controller and the transfer switch shall be done at the factory and the entire unit assembly is to be factory tested. The transfer switch shall include emergency power isolating switch, control relays, solid state sensing and timing equipment as well as the power transfer switch all in a N.E.M.A. 3R enclosure.

F. The pump shall be hydrostatically tested to 1½ times the working pressure but in no case to less than 250 lbs. per square inch. The pump unit shall be given a complete performance test and characteristic curves prepared from the test results shall be furnished. The test shall be made at the pump manufacturer's factory with its delivery.

Accessories to be furnished shall include:

1 - Set of suction and discharge gauge.
1 - Air release valve.
1 - Casing relief valve.
1 - Automatic ball drip valve.
1 - Approved flow meter installed in strict accordance with manufacturers instructions.
1 - Hose valve header with three (3) hose valves.

JOCKEY PUMP

G. Furnish and install an approved jockey pump having a capacity of not less than 4 G.P.M. at a TDH of 160 feet. This shall be furnished with cast iron case and bronze trim. It shall have a mechanical seal and not less than 1/2 H.P., dripproof motor wound for 208 Volt, 3 Phase, 60 Cycle current. For control furnish an adjustable mercury tube pressure switch, a circuit breaker, a magnetic across the line starter and a selector switch all in a single enclosure.

H. Provide a discharge pressure gauge on the Jockey Pump and a non-slam check valve. Provide a pressure gauge for the system. Pressure gauges shall be 4½" diameter 0-300 P.S.I. brass case with shut-off cocks.

PART 3 EXECUTION

3.01 MATERIALS

A. Unless specifically noted or indicated otherwise all equipment and materials specified in this section or indicated on the drawings shall be installed under this contract, whether or not specifically itemized herein. This part of the specification covers particular installation methods and requirements peculiar to certain items and classes of material and equipment.

3.02 STANDPIPE AND SPRINKLER SYSTEM

A. The system shall be constructed using materials as specified and/or indicated on Drawings SP-1 thru SP-5.

B. Piping shall be run parallel with the lines of the building; well supported from the structure; free from pockets or sag; and pitched to drain points.

3.03 CUTTING AND PATCHING INFORMATION

A. All cutting and patching of building structure shall be done and provided for by the General Contractor.

B. This Sub-Contractor shall specifically inform the General Contractor and the various trades concerned of the size and location of all chases, holes and supports, etc., in building structure which his work may require, and this Sub-Contractor shall be responsible for the construction and location of same.

C. This Sub-Contractor shall not cut away any steel, concrete, brickwork, floor construction or arches, or dig into any walls, or in any case allow the same to be done without the full knowledge and consent of the Architect, and this Sub-Contractor will be held responsible for any damage resulting from any such work.

D. In case the work of two (2) trades shall interfere in such a manner as to necessitate a devaition from the design, work shall not be altered until the Architect has been notified and has rendered a decision as to the manner in which the difficulty shall be overcome.

3.04 TESTING

A. At completion of work the system shall be subject to a hydrostatic test of 50 P.S.I. in excess of the maximum static pressure. Tests shall be in accordance with the requirements of Building Code, the National Board of Fire Underwriters' and local Fire Department.

SECTION 15800

HEATING & VENTILATING

PART 1 GENERAL

1.01 GENERAL

A. Attention is directed to the Bidding Documents, Contract Documents, and Division 1, which are herewith made a part of this section.

B. Review all drawings, and all sections of the specifications for provisions therein affecting the work of this section.

1.02 SCOPE OF WORK

A. Work to be performed under this Section without limiting the generality thereof, consists of furnishing all labor, material, equipment scaffolding, power tools and rigging, except as otherwise specified and performing all work as necessary to fully complete the Mechanical drawings and as specified hereinafter.

B. The following are included in contract under this heading:

1. Fans.
2. Ductwork, including registers and grilles.
3. Fire dampers and smoke dampers.
4. Insulation.
5. Louvers.
6. Temperature controls.
7. Air handling unit.
8. Testing and balancing.
9. Radiation.
10. Piping.
11. Hot water accessories.
12. Hot water boiler-burner units.
13. Smoke breeching.
14. Magnetic starters.

1.03 WORK BY OTHERS

A. The following related items are included under other Sections of this Specification.

1. Painting.
2. Temporary heat.

3. Excavation and backfilling.
4. Cutting and patching.
5. Electric power wiring (except as otherwise noted).
6. Electric wiring of smoke dampers.
7. Gas piping.

1.04 SHOP DRAWINGS

A. Submit shop drawings for approval in accordance with Division I, General Requirements.

1. Fans.
2. Registers and grilles.
3. Fire dampers and smoke dampers.
4. Insulation.
5. Louvers.
6. Temperature controls.
7. Air handling unit.
8. Radiation.
9. Hot water specialties.
10. Hot water boiler-burner units.
11. Magnetic starters.

1.05 DESIGN CRITERIA

A. In general the following design conditions shall be met:

1. Ventilation rates shall be in accordance with A.S.H.R.A.E. Standard 62-73, "Natural and Mechanical Ventilation", & Mass. State Code.
2. Heating in accordance with Mass. State Code.

1.06 SCAFFOLDING, RIGGING AND HOISTING

A. The Mechanical Contractor, shall provide scaffolding, rigging and hoisting for his work and he shall figure his cost for scaffolding, rigging and hoisting either by arranging with the General Contractor for the use of his or providing the necessary equipment for his own work. The Mechanical Sub-Contractor's bid must carry this expense at time of bidding.

1.07 EQUIPMENT AND MATERIALS APPROVAL

A. Within fifteen (15) days after the acceptance of the proposal, submit to the Architect for approval, a list of manufacturers for equipment and materials proposed for the work.

The Mechanical Contractor's intent to use exact makes specified does not relieve him of the responsibility of submitting such a list.

1.08 RECEIVING, STORING, PROTECTION AND SETTING

A. The Mechanical Contractor shall be responsible for receiving, unloading, uncrating, storing, protecting, insuring and setting in place, connecting up complete all materials, equipment and supplies furnished under these specifications which pertain to his work. This applies to that furnished directly by him, plus that which may be furnished to him by the Owner, or furnished to him under another Section of the Specifications.

B. Exercise special care in handling and protecting equipment and fixtures. The Mechanical Contractor shall be responsible for the cost of replacing any of the above equipment and fixtures which are missing, and for any finished work or equipment mentioned above, in his own phase of the work, which are damaged by reason of mishandling or failure to protect.

C. The Mechanical Contractor shall confine his apparatus, storage of materials and construction operations to such limits as may be directed by the General Contractor, so as not to interfere with the normal operating conditions of the building. He shall not unreasonably encumber the premises with his materials and equipment.

1.09 MATERIALS, LAYOUT AND WORKMANSHIP

A. All materials shall be new, and good quality of specification grade, Underwriters' Laboratories approved. All shop manufactured equipment shall be given at least one (1) coat of shop paint before delivery to the site.

B. Specific standards for the qualifications of operators for the execution of work shall be observed where cited herein, all workmanship shall conform to the best practice in the trade; all work shall be performed by skilled labor, with an experienced superintendent constantly in charge.

C. The work shall be done in such order and manner as not to hinder or delay the satisfactory completion of other work. Pay all costs caused by defective or ill-timed work for which he is responsible, and pay for any damage he caused to other work or property.

The Mechanical Contractor shall give priority to work in or for particular areas as directed by the the Architect.

D. Access and clearances must be provided and maintained for the proper operation, maintenance, service, and repair of the work and for the pulling of coils, shafts, and other removable elements. Where removable panels in building construction are required to give access to concealed work, provide the proper size panels to the General Contractor for installation.

E. Furnish all necessary templates, patterns, and details for installing the work. Furnish, locate, and set all sleeves and inserts and see that they are correctly built into place, and shall furnish and install all supports and fastenings for this work; but he shall obtain the Architect's approval for all sleeves, hangers, inserts, chases, cuttings, etc., required for or forming a part of the support, anchoring or routing of this work. All attachments to building construction shall be made with use of surface fastenings approved by the Architect. Furnish, locate and set foundation bolts in concrete equipment foundations; furnish and apply finish grout on such foundations.

F. Remove daily all rubbish and debris and all refuse from workmen's lunches, and at completion shall remove all his surplus materials, temporary works and construction plant, and leave the work in clean condition acceptable to the Architect.

1.10 INTENT

A. The entire work provided for in this Specification shall be constructed and finished in every respect in a workmanlike and substantial manner, according to the drawings and this specification.

B. It is not intended that the drawings shall show every fitting and appliance, but this Sub-Contractor shall furnish and install such parts as may be necessary to complete the system in accordance with the best practice of this trade and to the satisfaction of the Architect.

C. This Sub-Contractor shall provide all necessary tools, machinery scaffolding, and transportation for completing his work and shall remove all waste or broken material resulting from it.

1.11 GIVING INFORMATION

A. This Sub-Contractor shall keep himself fully informed as to the shape, size and position of all openings required for this apparatus and shall give full information to the General Contractor and other Mechanical Sub-Contractors sufficiently in advance of the work so that all openings may be built in advance.

1.12 FAILURE

A. In the case of failure on the part of this Sub-Contractor to give proper information as noted above, he will be required to do his own cutting and patching, to the satisfaction of the General Contractor, or have same done by the General Contractor, but in any case, same is to be done without extra expense to the Owner.

1.13 OBTAINING INFORMATION

A. This Sub-Contractor shall obtain detailed information from the manufacturers of apparatus which he is to furnish or install as to the proper method of installing and connecting same. He shall obtain all information from the General Contractor, and the other Mechanicl Sub-Contractors which may be necessary to facilitate his work and the completion of the whole project.

1.14 DRAWINGS

A. This Sub-Contractor shall refer to the Mechanical drawings and the Architectural floor plans and details for a full comprehension of the extent and detail of the work to be performed. These drawings are intended to be supplementary to the specifications and any work indicated, mentioned or implied in either is to be considered as specified by both.

B. All work shown on the drawings is intended to be approximately correct to the scale of the drawings, but figured dimensions and detailed drawings are in all cases to assume precedence over time.

C. This Sub-Contractor, before installing any of his work, shall see that it does not interfere with the clearance required for finished columns, pilasters, walls and ceilings, as shown on the contract architectural drawings and details.

D. Work installed by this Sub-Contractor which interferes with or modifies the Architectural design as shown on the contract drawings, shall be changed as directed by the Architect and all costs incident to such changes shall be paid by this Sub-Contractor.

E. In any and all cases of discrepancy in figures, plans or specifications, the matter shall be immediately submitted to the Architect for decision.

F. Should it appear that the character of the work herein contemplated or any matter related thereto is not sufficiently explained in the specifications or drawings, this Sub-Contractor may apply to the Architect for further information or drawings and shall conform to such when given as part of these specifications as far as they may be consistent with the original drawings and specifications.

1.15 TYPICAL DETAILS

A. Typical details where shown on the drawings shall apply to each and every item of the project where such items are incorporated. They are repeated in full on the drawings, which in many cases are diagrammatic only, but with the intention that such details shall be applicable in full.

1.16 GUARANTEE

A. This Sub-Contractor shall guarantee that all labor and materials required under this contract will be free from defects, and agrees on notice from the Owner to make good any and all defects in the work within one (1) year after acceptance of the work, to the complete satisfaction of the Owner and at no cost to the Owner.

B. This Sub-Contractor further agrees that if any damage occurs to any equipment, the building or merchandise stored therein, through defects in his materials or installation, he will repair, replace, or pay for such damage at no cost to the Owner or Tenant.

1.17 LOCATIONS

A. Location of all equipment, piping and ductwork on Mechanical plans shall be checked by the Mechanical Sub-Contractor against the general and detailed drawings of the construction proper. All measurements must be taken at the building. DO NOT SCALE DRAWINGS.

B. The drawings shall be taken in a sense as diagrammatic. Sizes of ductwork and pipes, and general method of running them, are shown; but it is not intended to show every offset and fitting nor every structural difficulty that may be encountered. All necessary parts to make complete working systems ready for use shall be furnished without extra charge.

C. The drawings and specifications are intended to supplement each other so that any detail shown on the drawings and not mentioned in the specifications, or vice versa, shall be executed the same as if mentioned in the specifications or shown on the drawings.

D. In case of conflict with parts of the building or the work of other trades, the Architect shall be notified immediately and requested to render a decision so that there may be no delay in the building construction.

1.18 QUALITY OF WORKMANSHIP

A. All work performed under this section shall be in accordance with the latest accepted practices, and shall be of the best workmanship.

1.19 CLEANING

A. All duct work shall be thoroughly cleaned of dirt and dust.

1.20 CODES, ORDINANCES & PERMITS

A. This Sub-Contractor shall give the proper authorities all requisite notices or information relating to the work in his charge, pay all fees, obtain all official licenses or permits and certificates and comply with the rules of the Underwriters' or Public Departments and with all local ordinances and state laws applying to this work.

1.21 COOPERATION

A. The work shall be carried on under the usual conditions affecting construction of the type involved, and in conjunction with other operations at the site. This Sub-Contractor shall cooperate with the Engineer and all Contractors working on the site. He shall coordinate his work with theirs and shall proceed in such a manner as not to delay or hinder in any way the progress of the work as a whole. In case of dispute, the Architect shall render a decision which shall be final.

1.22 PROTECTION

A. This Sub-Contractor shall take proper precautions to protect his work and materials from loss or damage until the complete installation is turned over to the Owner. Any loss or injury shall be made good without expense to the Owner.

1.23 TAGS AND CHARTS

A. Tags: All valves in the Heating system furnished and installed by the Heating & Ventilating Contractor shall be fitted with numbered tags securely fastened to the valve handles with S hooks. Tags shall be fabricated from black fibre approximately one-eighth (1/8") inch thick, brass or with white filled letters and figures approximately three-eighths (3/8") inch high. Valves shall be numbered consecutively.

B. Charts: Three (3) tabulated records of the valves showing the valve number, location and service shall be typewritten. These records shall be submitted to the Architect for correction or approval. After final approval, one (1) record shall be framed under glass, and mounted in Boiler Room and the other two (2) shall be handed to the Owner's representative.

1.24 OPERATING INSTRUCTIONS

A. For two days prior to the completion of the work, this Contractor shall give detailed instructions to the responsible person or persons designated, in the operation and maintenance of all work installed under this contract.

B. When the operating instructions have been completed, this Contractor shall notify the Architect in writing stating when, to whom and number of days such instructions have been given.

1.25 IDENTIFICATION OF MATERIALS AND EQUIPMENT

A. Each item of equipment including controls, not provided with a manufacturer's name plate, shall be identified and with a name plate made of black surface, white core laminated bakelite with indented letters, securely attached with two (2) "Phillips-Head" brass screws or machine bolts with locknuts. Adhesvies shall not be used for the mounting of name plates. Name plates shall be minimum of three (3") inches long by one and one-half (1½") inches wide and shall bear the equipment name as designated in the equipment schedules of the specifications.

PART 2 PRODUCTS AND MATERIALS

2.01 GENERAL

A. All materials and equipment necessary to make the installation complete in every detail shall be furnished and installed under this contract whether or not specifically indicated on the drawings or specified herein. All materials and equipment shall be new.

B. It is the intent of the specifications that one manufacturer be selected, not a combination, for any particular classification of material. For example, all valves of one manufacturer, all diffusers of one (1) manufacturer, etc., except specific material classifications in which delivery time becomes a problem the Architect & Engineer may give specific exemption from this requirement.

C. Where materials, equipment apparatus, or other products are specified by manufacturer, brand name, type or catalog numbers, such designation is to establish standards of performance, quality, type and style.

2.02 CIRCULATING PUMPS

A. Pumps shall be of the centrifugal type mounted in pipe lines. Pumps shall be suitable for continuous operation at 225° maximum temperature. Pumps shall be suitable to operate at a maximum pressure of 125 p.s.i. Bearings shall be bronze sleeve type. For capacity see pump schedule on drawing. Pumps shall be Bell and Gossett, Taco or Thrush.

2.03 PIPING MATERIALS

A. Unless otherwise noted, all piping, including nipples, shall be of new material, absolutely perfect throughout, scale free, and be of the best grade guaranteed full weight.

B. All pipe shall be Schedule 40, black steel.

C. All nipples and fittings shall be of the same material and thickness as the pipe with which they are used, except where screwed fittings are used, in which case, they shall be of close grained cast iron standard weight.

D. Flanged joints shall be made up with one-sixteenth (1/16") inch thick, ring type, compressed sheet asbestos gaskets, cold-pressed semi-finished hexagon nuts, and square forged head commercial steel bolts.

E. Where union connections are indicated, specified, or necessary for ferrous pipe two (2") inches in diameter, and smaller, they shall be brass seated, black malleable iron. On piping two and one-half (2½") inch in diameter and larger, unions shall be flanged pattern.

F. Sleeves shall be provided for all piping passing through walls, slabs, partitions, or other building construction. Sleeves through concrete slabs may be of the plastic type. Sleeves through wall or partitions shall be steel.

G. Escutcheons - Where exposed pipes pass through floors, finished walls, or finished ceilings, they shall be fitted with neat, heavy spun or stamped steel, chrome plated escutcheons, firmly secured to the pipes. Escutcheons shall be of sufficient outside diameter to amply cover the sleeved openings for the pipe.

H. Furnish and install Type "M" hard drawn copper tubing with wrought copper sweat fittings using solder 50/50 on all city water lines for the boilers, heating feed systems and all other equipment supplied by this Contractor which required city water connections.

I. Either flanged or screwed union connections shall be made to all boilers, pumps, heating coils, fin coil, apparatus and unit heater.

2.04 PIPE HANGERS AND SUPPORTS

A. All piping systems shall be supported by means of hanger having individual means of vertical adjustment, and shall be fabricated in accordance with Section Six of the American Standards Association Code for pressure piping and Underwriters' approved.

B. Horizontal piping lines shall be supported by means of threaded rods attached to malleable iron inserts.

C. Roll supports to be used on all piping where there is longitudinal movement due to temperature changes.

D. Pipe covering protection saddles shall be used at each hanger with a roll of sufficient size to take the saddle.

E. Maximum spacing of hangers or supports:

1/2" to 1" pipe - 7 ft.
1-1/4" to 2" pipe - 10 ft.
2-1/2" to 3-1/2" pipe - 12 ft.
4" to 6" pipe - 14 ft.

F. Where concentrated loads such as heavy valves or fittings occur, supports shall be installed within two (2) feet of the load.

G. Anchors welded to the pipe shall be installed to permit the line to take up its expansion and contraction freely in opposite directions away from the anchored point. Where expansion joints are used, pipe guides shall be installed to allow the pipe line to move freely within the expansion joint. All risers are to be anchored to floor construction by means of welded anchors.

H. Hanger rods of ASTM A-107-42 hot rolled steel shall be of the following minimum sizes for fire protection.

3/4" to 2" pipe	3/8" rod
2½" to 3½" pipe	1/2" rod
4" to 5" pipe	5/8" rod
6" pipe	3/4" rod

I. Hangers to be Milford, Carpenter and Patterson, Grinnell, Calco,or approved equal

All insulated piping which contains hot water only shall be equipped with Fig. 186 pipe insulation protection saddles.

Hangers used on copper tubing shall be copper plated.

J. The Heating & Ventilating Contractor shall furnish, erect and install all the structural steel supports and hangers for the mounting of all air handling equipment and all other equipment furnished by him.

2.05 EXPANSION AND OFFSETS

A. Provisions for expansion in the piping shall be made by the installation of offsets or pipe loops with anchors, or expansion joints with anchors wherever indicated on plans or as may be required.

B. All piping having expansion loops, expansion joints or offsets shall be securely anchored to building construction in such a manner as to throw all expansion toward the expansion loops or offsets.

C. Expansion joints shall be as manufactured by Fulton Sylphon Co., Badger Manufacturing Co., or Adsco.

2.06 VALVES

A. Furnish and install valves where shown on plans and also wherever necessary to make the system complete in its operation. All valves must be so constructed that they may be repacked under pressure while open.

1. Throttling valves shall be installed in all lines where regulation is required.
2. Swing check valves shall be installed in all lines where flow may reverse from intended direction.
3. Combination balance and shut-off valves shall be ball valve, Apollo, Nibco or Watts.
4. Except for above, or as otherwise noted on plans, gate valves shall be installed in all supply and return lines.

2.07 SHEET METAL WORK

A. All ductwork is shown diagrammatically only and any changes in duct sizes and locations shall be done at no cost to the Owner.

Ductwork shall be as follows:

Largest Division Inches	U.S.Standard Gauge of Sheet Metal	Transverse Joint Connection & Centerline Spacing	Manner of Bracing
Up to 12	26	S slip; 7'-10"	None
13 to 24	24	S slip; 7'-10"	None
25 to 30	24	S slip; 7'-10"	1"x1"x1/8" angles 4'-0" from joint
31 to 40	22	Drive slip; 7'-10"	1"x1"x1/8" angles at & between joints

B. Fittings may be constructed of Pittsburgh type lock seams. Cross break each duct panel wider than twelve (12") inch on all four (4) sides of duct so as to provide extra assurance of stiffness. Insulated ducts shall have no cross break. End of duct sections shall be notched and lapped at least one (1") inch and connected with bar slip. S slip or drive caps. Call slips shall be at least one (1) gauge heavier than the duct and all joints must be made in a neat and workmanlike manner. In all cases, the joint must be tight.. All laps are to be made in the direction of air flow, so as to leave a smooth finished surface inside the ducts.

C. All inside groove seams shall be prick-punched 2' on centers. All bar slips shall be clipped two (2") inch from edge and ten (10") inch on center. Seams must be thoroughly flattened down, internal surfaces smooth and all joints absolutely airtight.

D. All notches for connecting sections of duct and all grooving seam notches shall not be cut any deeper than necessary to insure tight corners. Any notched corners not meeting with the approval of the Architect shall be removed and reinstalled or sealed with solder to the approval of the Architect.

E. All ductwork shall be in strict accordance with A.S.H.R.A.E. guide and S.M.A.C.N.A.-Sheet Metal & Air Conditioning National Association, Inc.

2.08 LOUVERS AND SCREENS

A. Furnish all louvers, except as noted, with removable four (4) mesh aluminum screens to the General Contractor for installation in building construction by the General Contractor.

B. Louver blades are to set in their frames at 65° with upper and lower edges turned three-fourths (3/4") inch to prevent water entry. Intermediate reinforcing bars shall be included to stiffen blades and prevent sagging. The free area of each louver shall not be less than 50% of the gross masonry opening.

C. All louvers and aluminum brick vents shall be extruded aluminum. Color by Architect.

D. Louvers and screens shall be Penn, Airstream Model SA, Ruskin, or Metal-Aire.

E. All louvers shall be installed by General Contractor.

2.09 REGISTERS, GRILLES & DIFFUSERS

A. Furnish and install registers, grilles and diffusers of size shown on drawings. Registers shall be Titus, Metal-Aire or Grillemaster.

2.10 FIRE & SMOKE DAMPERS

A. Furnish and install where indicated on the drawings or where required approved fusible link, self-closing fire dampers.

B. All fire dampers, unless otherwise noted on the drawings, shall be constructed and installed in accordance with the National Fire Protection Association, and Underwriters' Laboratories label.

C. Furnish and install full size access doors at all fire and smoke dampers.

D. Fire dampers between grilles and fire partitions shall be Prefco #5650F, Ruskin, or United. Fire dampers, unless otherwise noted, shall be Type B, Prefco, Ruskin or United.

E. Smoke damper shall be motor operated 120 Volt, 1 Phase, 60 Cycle motor, Ruskin Model SD-35, Prefco or United.

F. All wiring and materials and labor required to interconnect all smoke dampers shall be furnished and installed by Electrical Sub-Contractor.

G. Access panels will be furnished by the General Contractor.

2.11 AUTOMATIC DAMPERS

A. All automatic dampers furnished under the paragraph of these specifications entitled "TEMPERATURE CONTROLS" shall be installed by this Contractor. A full size access door shall be installed at each automatic damper.

2.12 MAGNETIC DAMPERS

A. Furnish magnetic starters for all motors one-half (1/2) H.P. and larger.

B. Magnetic starters shall be furnished with windings to match windings of the motors to be used.

C. Magnetic starters shall be installed and wired under Section 16100, Electrical.

D. Magnetic starters shall be furnished with three (3) thermal overloads.

2.13 EXHAUST FANS

A. Furnish and install fans where shown on drawings.

B. Motor and fan assembly shall be on vibration isolating mounts.

C. Fans shall be furnished with back draft dampers, bird guards, prefabricated curbs and disconnect switches.

D. Curbs shall be installed by the General Contractor.

E. For fan performance see drawings.

F. Fan shall be Penn, Greenheck, Loren-Cook.

2.14 INSULATION

A. Insulate all fresh air ductwork with one (1") inch thick fiberglass blanket insulation with vinyl jacket. Insulation shall have a flame spread rating of 25 maximum and smoke developed rating of 50 maximum.

A. Insulation shall be wrapped tightly on ductwork with all circumferential joints butted longitudinal joints overlapped a minimum of two (2") inch. Adhere insulation with four (4") inch stripes of insulation Bonding Adhesive. Secure insulation to bottom of rectangular ductwork over twenty-four (24") inch wide with suitable mechanical fasteners at no more than eighteen (18") inch on centers.

B. Insulate all heating piping with one (1") inch nominal thick fiberglass. One-piece pipe insulation jacketed with a vinyl coated and embossed vapor barrier laminate. Insulation shall be Owens/Corning Fiberglas 25 ASJ (all service jacket), John-Manville or Carey. Cover all fittings and flanges with an equal thickness of prefab Zeston. All paper stickers shall be removed from covering. All above insulation shall be Owens-Corning, John-Manville or Carey, and comply to Massachusetts Code, Table 2010.13.

C. Emergency Generator Piping - Insulate emergency generator with calcium silicate one-half (1/2") inch thick block. Finish block insulation with a trowelled coating one-fourth (1/4") inch thick of insulation cement. Owens/Corning "Kaylo-10", Johns-Manville or Carey.

2.15 RADIATION

A. Furnish and install where shown on drawings radiation complete with hangers, mounting components enclosures and access panels. Radiation shall be arranged for installation as a unit wall to wall, unless otherwise noted. Radiation shall be copper tubing with aluminum fins. For size and location see drawings. Radiation shall be baseboard as manufactured by Sterling, Slant Fin, or Vulcan.

2.16 AIR VENTS

A. Furnish and install at all high points in hot water flow and return mains to properly vent the system an automatic float type air vent. Each vent shall be one-half (1/2") inch size and provided with one-fourth (1/4") inch overflow to drain.

B Each section of heating element shall have a manual air vent.

C All access panels by General Contractor.

D All air vents shall be Bell and Gossett, Taco or Thrush.

2.17 HOT WATER HEATING SPECIALTIES

A Balancing cocks for main shall be square head plug cocks with plugs ground into cock bodies. Cock two (2") inches and smaller shall be brass screwed, two and one-half (2½") inches and larger shall be all iron and flanged.

B Balancing fittings for heating equipment shall be brass screwed with union ends, screw drives slot type adjustment, either straight-way type or angle type Sarco or equal.

C Flow control valves as shown or required shall be iron body with flanged ends two and one-half (2½") inches and over and screwed ends for two (2") inches and smaller. They shall be Bell & Gossett Co., or approved equal.

D Float type automatic air vents shall be provided for all high points of the piping system, suitable for 125 p.s.i. working pressure.

The above units shall be provided with drain connections to the floor when installed in the Boiler Rooms and without drain connection when installed in other areas.

Vents shall have provision for manual closing with cock installed between vent and piping.

E Disc type automatic air vents shall be installed on each section of radiation and shall be equipped with chamber vent and positive shut-off.

Radiator vents shall be suitable for 125 p.s.i. gauge working pressure.

2.18 AUTOMATIC CONTROL VALVE (ACV)

A. Where indicated, radiation shall be provided with 24 Volt, 60 Cycle, electrically operated zone control valves. Valves shall be installed by the Heating Sub-Contractor, and wired by the Electrical Sub-Contractor. Valve is to be installed as shown on drawings. Two (2) wire thermostats shall be provided by the valve manufacturer to insure proper operation. (1-40 VA transformer for each valve shall be supplied) the zone control valves shall be two (2) position on-off valves. Transformers and thermostats shall be installed and wired by the Electrical Sub-Contractor. The valves shall be actuated directly by a heat motor. The power unit shall consist of a silently operating heat motor, a manual operating lever. Only one (1) power unit shall be required to service all sizes of valves. The valve shall have a bronze body, be normally closed valve of packless construction. Valve shall shut off tightly against 150 feet of pump head. The valve shall be designed to operate at water temperatures of 40°F. to 240°F. and 125 p.s.i. system pressure. The thermostat shall be designed primarily for use with the zone valve supplied and be furnished by the manufacturer of the valve. It shall have a position snap action single pole single throw switch with multiple contacts, a low mass bi-metal actuator for sensitive control and shall be provided with heat anticipation for improved temperature control The thermostat shall operate within a temperature differential of 2°F. and be adjustable over a range of 50°F. to 90°F.

2.19 VIBRATION ISOLATORS

A. This Contractor shall furnish and install all vibration eliminators as recommended by the manufacturer and as manufactured by Vibration Eliminator Co., Amber-Booth, Consolidated Kinetics or approved equal, for the mounting of all air-handling equipment, and all other equipment which requires isolation. The supports shall be of suitable strength to support the equipment and the movement action of the equipment and shall be properly secured to the building structure.

2.20 MAGNETIC STARTERS

A. Furnish magnetic starters for all motors one-half (1/2) H.P. and larger. Magnetic starters shall be furnished with windings to match windings of the motors to be used. Magnetic starters shall be installed and wired under Section 16, Electrical. Magnetic starters shall be furnished with three (3) thermal overloads.

2.21 BOILERS

A. Furnish and install where indicated on the plans, cast iron gas-fired modular hot water heating boilers complete with all accessories in accordance with manufacturer's instructions and in compliance with all rules and regulations of authorities having jurisdiction.

B. Boiler ratings shall be AGA-1-B-R approved and boilers shall be equipped for operation on natural gas.

C. Gas controls for each heating module shall be factory tested and shall be suitable for firing each module individually. For each heating module the manufacturer shall supply hi-limit control cast iron flue collector. Each battery shall be equipped with one or more A.S.M.E. approved relief valves with a total capacity corresponding to the input rating of each battery. The Contractor shall provide and install common breeching for all modules in accordance with recommendations of the boiler manufacturer.

D. Contractor shall manufacture and install the required supply and return manifolds. The manifolds may be attached to the boilers with unions, flanged joints or other methods meeting local codes. Manifolds should have necessary pipe tapping for insertion of relief valves, tridicators and thermostatic controls, where specified by the manufacturer. (Level III step-firing control suitable for step-firing each module individually.)

E. For size and location of boilers see plans. Boilers shall be Hydrotherm, Weil McLain or H.B. Smith.

2.22 BREECHING

A. Furnish and install twenty-two (22) gauge galvanized iron smoke pipe as shown on drawings. Inlet to chimney shall be packed with three-fourths (3/4") inch asbestos rope one (1") inch deep at stack with thimble.

PART 3 INSTALLATION, TESTING & BALANCING

3.01 GENERAL

A Unless specifically noted or indicated otherwise all equipment and materials specified in SECTION 15B, or indicated on the drawings shall be installed under this Contract, whether or not specifically itemized herein. This part of the specification covers particular installation methods and requirements peculiar to certain items and classes of material and equipment.

3.02 COOPERATION AND WORK PROGRESS

A The Heating & Ventilating work shall be carried on under the usual construction conditions, in conjunction with all other work at the site. The Heating & Ventilating Contractor shall cooperate with the Architect and all Contractors and equipment suppliers working on the site, coordinate the work and proceed in a manner so as not to delay the progress of the project.

B The Heating & Ventilating Contractor shall coordinate his work with the progress of the building and other trades so that he shall complete his work as soon as conditions permit and so that interruptions of building functions incurred due to lack of or improper coordination with other trades or the Architect by the Heating & Ventilating Contractor shall be assumed by the Heating & Ventilating Contractor without any additional cost to the Owner.

C Waste material shall be removed promptly from the premises. All material and equipment stored on the premises shall be kept in a neat and orderly fashion. Material or equipment shall not be stored where exposed to the weather. The Heating & Ventilating Contractor shall be responsible for the security, safekeeping, and damages, including acts of vandalism, to all material and equipment stored at the job.

D The Heating & Ventilating Contractor shall erect and maintain at all times necessary safeguards for the protection of life and property of the Awarding Authority, workmen, staff and the public.

E The Heating & Ventilating Contractor has a responsibility to coordinate the exact mounting arrangement and location of equipment indicated on the drawings to allow for proper space requirements for equipment access, operation and maintenance. Particular attention shall be given in the field to such group installations. If it is questionable that insufficient space or conflict with the work of other Sub-Contractors, or Architectural and Structural obstructions will result in an arrangement which will prevent proper access, operation or maintenance of the indicated equipment, the Heating & Ventilating Contractor shall immediately notify the Architect and not proceed with this part of the contract work until definite instructions have been given to him by the Architect.

F It shall be the responsibility of the Heating & Ventilating Contractor to coordinate the delivery of Mechanical equipment to the project prior to the time installation of equipment will be required, but he also shall make sure such equipment is not delivered too far in advance of such required installation, to assure that possible damage and deterioration of such equipment will not occur. Such equipment stored for an excessively long period of time (as determined in the opinion of the Architect on the project site prior to installation may be subject to rejection by the Architect.

3.03 CUTTING, FITTING, PATCHING AND PAINTING

A It shall be the duty of the Heating & Ventilating Contractor to consult with and to give to the General Contractor exact locations and sizes of all openings and full information as to cutting necessary for the installation of his work, and it shall be the duty of the General Contractor to provide the same, and should be, after having been fully advised by the Heating & Ventilating Contractor, fail to arrange properly for this work, this Contractor shall promptly notify Architect in writing of such failure.

B It shall be the duty of the Heating & Ventilating Contractor to securely set all sleeves in connection with this work, in forms before the concrete foundations, walls, slabs, partitions and other building construction is complete.

C In the event of any disagreement between the Heating & Ventilating Contractor and the General Contractor over the foregoing the decision of the Architect shall be final.

3.04 TESTING AND BALANCING

A The Heating & Ventilating Contractor shall run a test under normal operation conditions, during which test all necessary adjustments and changes required for proper operation shall be made. This test shall be continued until the systems operate without frequent adjustment.

B During this test period, this Contractor shall take temperature readings of all systems, also, make necessary adjustments to automatic temperature controls to insure correct room temperature and reasonably quiet and efficient operation.

C Fuel, water and electricity for all tests will be furnished by the General Contractor, equipment necessary to conduct above tests shall be provided by this Contractor.

D Tests - General

1. All piping shall be installed drip tight and arranged for proper drainage and air elimination. If upon testing, leaks develop or the installation fails to function properly, this Contractor shall make all necessary corrections and new tests shall be made and repeated, until all defects have been remedied. Corrections necessary for the proper functioning of the installation shall be made to the satisfaction of the Architect-Engineer before final acceptance of the work.

2. This Contractor shall furnish all labor, materials, instruments, etc., necessary for all tests specified.

E Tests - Piping

1. Before closing in, before covering is applied and before connections are made to equipment, all supply and return piping shall be hydrostatically tested to a pressure of not less than seventy-five (75) pounds gauge pressure for a period of not less than four (4) hours without loss of pressure. If any leaks develop, necessary repairs shall be made subject to an eight (8) hour working test. The stuffing boxes on all valves shall be repacked with new packing and shall be made tight.

F Testing and Balancing - Duct Work

1. The Heating & Ventilating Contractor shall run a test under normal operating conditions during which test all necessary adjustments and changes required for operation shall be made. This test shall be continued, until the system operates without frequent adjustment.

2. During this test period the Heating & Ventilating Contractor shall take readings of air flow on all systems, and make necessary adjustments to deflectors and dampers to insure correct air flows and reasonably quiet and efficient air flows.

3. The Ventilating Contractor shall supply the Architect with four (4) copies of table showing measured and specified air quantities of each exhaust register.

Equipment necessary to conduct above tests shall be furnished by the Ventilating Contractor.

3.05 WIRING

A. Heating Sub-Contractor shall furnish, install and wire oil/gas burners in accordance with all local and state code requirements.

B. All exhaust fan wiring shall be furnished and installed by the Electrical Sub-Contractor.

C. All power wiring for hot water heating circulating pumps and unit shall be furnished and installed by the Electrical Sub-Contractor.

D. Heating Contractor shall furnish, install, and wire all Automatic Temperature Control Systems, except temperature control wiring of Radiation Control Valves, Wiring of Automatic Control Valves (ACV) shall be furnished and installed by Electrical Contractor, see page 18, paragraph 2.18.

E. All wiring shall be done in accordance with the National Electric Code, Massachusetts State Code and all local requirements.

DIVISION 16

ELECTRICAL

SECTION 16000

ELECTRICAL

PART 1 GENERAL

1.02 WORK INCLUDED

A. The work to be performed under this Section includes the furnishing of all labor, material, and equipment to complete the Electrical work as shown on the drawings and as herein specified.

B. The principle items of work are as follows:

1. Services to buildings.
2. Work at transformer including grounding. (400 Mass Ave. only)
3. Service from transformer to main distribution switchboard.
4. Main distribution switchboard, distribution centers.
5. Meter centers, panelboards, load centers.
6. Feeders to panels and load centers.
7. Conduit work.
8. Wire and cable work.
9. Safety switches and fuses.
10. Branch circuit wiring to all outlets and devices.
11. Outlets and devices.
12. Lighting fixtures and lamps.
13. Exterior lighting systems.
14. Emergency battery units.
15. Telephone conduit and sleeve systems where required, wiring from interface to outlets.
16. Apartment intercom systems, connected to telephone system.
17. Fire alarm systems.
18. TV Antenna sytems.
19. Elevator wiring.
20. Wiring for Heating, Air Conditioning, Ventilating, Hot Water, and other Plumbing Systems.
21. Wiring for disposers, dishwashers, ranges, laundry equipment and range hoods.
22. Wiring for fire pump.
23. Wiring for all other mechanical equipment not herein listed.
24. Temporary light and power.
25. Time clocks.
26. Wiring for exhaust fans.
27. Emergency generator - 400 Mass Ave only.

C. It is the intent of the specifications and accompanying drawings that the systems shall be furnished and installed complete. The Electrical Subcontractor shall furnish and install all conduit, wire, boxes, equipment, devices and materials usually furnished in connection with such work, whether specifically mentioned or not.

1.02 RELATED WORK

A. The following work in conjunction with the work done under this Division of the Specification shall be done under other Divisions of the Specifications. This work shall be done at no expense to the Electrical Sub-Contractor, except as indicated for the electric service.

B. General Contractor

1. Excavation and backfilling for all electric, fire alarm, telephone and site lighting underground conduit.

2. Cost for energy consumed by all trades including cost of lamp replacements for all temporary light and power.

3. Caulking and patching of all holes for conduit sleeves.

4. Installation of front entrance electric door openers.

5. Installation of concrete bases for post lights, concrete mat - 400 Mass Ave. only.

6. Backboards for telephone equipment and meter centers.

7. All finish painting.

C. Boston Edison

1. Furnish and install services to the buildings.

2. Electrical Sub-Contractor to pay backcharges.

2. Furnish and install meters.

D. Telephone Company

1. All telephone wiring from street lines.

2. All telephone outlets and all costs for work beyond SNI boxes shall be responsibility of Electrical Sub-Contractor.

1.03 COOPERATION

A. The work shall be carried on under the usual conditions affecting construction of the type involved and in conjunction with other operations at the site. The Electrical Sub-Contractor shall cooperate with the Architect and all contractors working on the site. He shall coordinate his work with theirs and shall proceed in such a manner as not to delay or hinder in any way the progress of the work. In case of dispute, the Architect shall render a decision which shall be final.

B. The Electrical Sub-Contractor shall secure instructions from General Contractor as to space for storing materials and tools, and shall keep and remove all debris, unused materials, and equipment from the premises as promptly as possible.

1.04 MATERIALS AND WORKMANSHIP

A. Materials and workmanship shall be of their respective kinds and in full accordance with the most modern construction methods. Electrical materials and equipment for which there are Underwriters' Laboratories standard requirements, listing or labels shall conform to these requirements and be so labeled.

1.05 GUARANTEE

A. The Electrical Subcontractor shall guarantee his work for a period of one (1) year from the date of final acceptance. If any defects in materials or workmanship occur within this period, they shall be corrected by the Electrical Sub-Contractor at no cost to the Owner.

1.06 TESTS

A. The Electrical Sub-Contractor shall furnish all equipment, personnel, and power for the testing of all work and equipment as directed by the Engineer or authorities having jurisdiction.

B. The entire installation shall be tested for shorts, grounds, and open circuits. All defects shall be corrected before acceptance of the work. All work shall be demonstrated to be in proper operating condition to the complete satisfaction of the Architect and Owner. The Electrical Sub-Contractor shall instruct the Owner's representative in the care and operation of all apparatus and equipment forming the installation.

1.07 PERMITS AND CODES

A. The Electrical Sub-Contractor shall obtain all permits, pay all fees, give all proper authorities all requisite notices, and comply with all rules and regulations affecting his work.

B. All conduit and electrical equipment shall be installed and grounded in accordance with the latest rules and regulations of the Massachusetts Electric Code, the requirements of the Boston Edison Co. and the City of Boston Electrical Department.

1.08 SUBSTITUTION OF MATERIALS

A. Reference to manufacturer's catalog numbers, types, etc., either in the specifications or on the drawings, are not intended to be restrictive, but they are intended to describe the type and quality required. Request for approval for substitution shall be accompanied by sufficient data, specifications and drawings to indicate compliance with the specified requirements.

B. The Electrical Sub-Contractor shall assume the cost and the entire responsiblity for any changes which he may propose in the work as shown on the Contract Drawings which may be occasioned by approval of material or equipment other than that specified.

1.09 MATERIALS AND SCHEDULES

A. As soon as practicable and within thirty (30) days after date of award of contract and before any materials, fixtures or equipment are purchased, the Electrical Sub-Contractor shall submit in writing to the Engineer for approval, a complete list in triplicate, of materials, fixtures, and equipment to be incorporated in the work and as covered by the Specifications. The list shall include catalog numbers, cuts, diagrams, drawings, and other descriptive data as may be required by the Engineer.

B. Approval of materials will be based on manufacturer's published ratings. Any materials, fixtures, or equipment listed which are not in accordance with the specified requirements will be rejected.

C. If prior to the expiration of the above specified period, or any authorized extension thereof, the Engineer fails to receive a list of materials, fixtures and equipment as specified above the Engineer will select a complete line of materials, fixtures and equipment. This selection shall be final and binding and all items shall be furnished and installed by the Electrical Sub-Contractor without change in contract price and time of completion.

1.10 TEMPORARY ELECTRIC SERVICES

A. The Electrical Sub-Contractor shall furnish, install and pay for all labor and equipment required for the temporary electric service.

B. The Electric Sub-Contractor shall make all necessary arrangements with Boston Edison Company as to where the temporary electrical service can be obtained.

C. The Electrical Subcontractor shall secure and pay for all required permits, certificates, back charges for work performed by others, and other expenses incidental to the installation of the temporary electric service. All work shall comply with the latest requirements of O.S.H.A.

D. Provide a temporary service of sufficient size from Boston Edison Company to the building, as required to provide electric light and power while the building is under construction and until the permanent feeders have been installed and tested. Install and maintain a feeder or feeders of sufficient capacity for the

requirements of each floor.

E. The temporary electric service shall be based on the following:

1. Rooms or spaces under 250 square feet - one 100 Watt lamp.

2. Rooms or spaces over 250 square feet and under 500 square feet-two 100 Watt lamps.

3. Rooms or spaces over 500 square feet - one 200 Watt lamp per every 1,000 square feet or fraction thereof.

4. Sufficient wiring, outlets and lamps shall be installed to insure proper lighting in stairwells, corridors and passage areas.

5. Outlets shall be located at convenient points, so that extension cords of not over 50 feet in length will reach all work requiring light or power.

6. Temporary electric service shall be provided for the offices of the General Contractor and of the Project Representative, until such time as the removal of these offices is ordered by the Contractor.

F. All necessary transformers, meters, cables, panelboards, switches and accessories required by the temporary light and power installation shall be provided by the Electrical Sub-Contractor.

G. The General Contractor shall pay the costs of all energy consumed by himself and by all the sub-contractors, until the time of completion.

H. The General Contractor shall furnish for installation by the Electrical Sub-Contractor all lamps, both initial and replacement, used for the temporary lighting system.

I. The General Contractor and all sub-contractors, individually, shall furnish all extension cords, lamps, sockets, motors and accessories required for their work.

J. The General Contractor and all sub-contractors shall reimburse the Electrical Sub-Contractor for the following:

1. Any temporary wiring of a special nature, other than that specified above, required for their work.

2. Any temporary wiring of construction offices and buildings used by them, other than the office of the General Contractor and of the Project Representative.

K. All temporary wiring, service equipment, and accessories shall be removed by the Electrical Subcontractor when directed by the General Contractor.

L All lamps installed in permanent lighting fixtures and used as temporary lights during the construction period shall be removed and replaced shortly before the time of completion by the set of lamps required to be furnished and installed under contract.

1.11 PROTECTION

A. The Electrical Sub-Contractor shall take proper precautions to protect his work and materials from loss or damage, until the complete installation is turned over to the Owner. Any loss or injury shall be made good without expense to the Owner.

1.12 SHOP DRAWINGS

A. The Electrical Sub-Contractor shall submit for approval to the Engineer, before starting the installation, five (5) prints each of the following equipment. He shall also provide wiring diagrams as required (no standard wiring diagrams will be accepted).

1. Distribution switchboard.
2. Safety switches.
3. Panelboards and load centers.
4. Meter centers.
5. Fire alarm systems.
6. Emergency battery units.
7. Emergency generator.
8. Lighting fixtures.
9. Apartment intercom system.
10. Outlets and devices.
11. Time clocks.
12. Any other drawings required or requested by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Drawings and specifications are intended to supplement and explain each other. Materials not specifically mentioned in the specifications shall be as indicated on the drawings. Where conflicts occur between the drawings and/or specifications, or within either document itself, the item of arrangement of better quality, greater quantity of higher cost shall be included in the Sub-Contractor's bid. Where no specific kind of quality of material is given, a first-class standard article, as approved in writing by the Architect, shall be furnished.

B. All materials, equipment and fixtures shall be new, without imperfections and shall be furnished, delivered, erected, connected and finished in every detail. Wherever possible, all trim, accessories and parts shall be of the same manufacturer as the related equipment and fixtures.

2.02 SERVICE DISTRIBUTION CENTER

A. Furnish and install the service distribution centers as indicated complete with the service entrance equipment, disconnects, meter sockets, wire troughs, fittings, conduit, wire and connectors.

2.03 METERING

A. The Electrical Sub-Contractor shall furnish and install all materials required and not furnished by Boston Edison Company for the meter installations.

B. The Electrical Sub-Contractor shall furnish and install the meter breaker centers, as called for on the drawings. The meter breaker centers shall be prefabricated assembly complete with all meter sockets, bussing, wiring, connectors and devices. The entire installation shall be in accordance with Boston Edison Company's standards.

C. The Electrical Sub-Contractor shall furnish and install all individual meter sockets and associated equipment where so indicated.

2.04 PANELBOARDS (HOUSE PANELS)

A. Furnish and install panelboards, as shown on the plans and on the panelboard schedule. Panelboards shall be dead front equipped with thermal-magnetic molded case circuit breakers of frame, trip ratings,and interrupting capacities, as shown on the panelboard schedule.

B. Panelboards shall be manufactured in accordance with the latest N.E.M.A. standards and shall be listed by Underwriters' Laboratories, Inc.

C. Main Bus Assembly - Panelboard main bus and main lugs shall have current ratings, as shown on the panelboard schedule. Current density shall be in accordance with Underwriters' Laboratories requirements. Bus bars for three (3) phase panelboards shall be sequence phased. Wiring lugs shall be suitable for the type conductor specified.

D. Circuit Breakers - Bolt-on circuit breakers shall be quick-make and quick-break and be trip free on overload or short circuit.

E. Circuit Breakers - Multi-pole breakers shall be common trip. The breakers shall be interchangeable in any combination of poles. Wiring terminals shall be suitable for the type conductor specified. Connections to the bus shall be bolt-on.

F. Cabinets and Trim - The gauge of the steel box enclosing the panelboard assembly shall be as specified by Underwriters' Laboratories Standards. End walls shall be removable. The size of wiring gutters shall be in accordance with Underwriters' standards. Trims shall be code gauge steel with primer and durable AMA 61 gray enamel finish. Trims shall be equipped with spring latch and tumbler lock keyed alike. Each individual circuit shall be clearly numbered on the face of the panelboard and a directory for circuit identification provided.

G. Panelboard Short Circuit Rating - The short circuit rating of the panelboard shall be established by short circuit testing in accordance with N.E.M.A. standards. Panelboards shall be Type NQOB as manufactured by Square D, Westinghouse, General Electric, I.T.E.

2.05 APARTMENT LOAD CENTERS

A. The apartment load centers shall include a ground bus. Each unit shall be equipped with plug-in type thermal-magnetic molded case, circuit breakers with trip ratings, as shown on the schedule.

B. Two-pole breakers shall have a common trip. The load centers shall have sufficient wiring area to allow clear passage of the feeder conductors, so as not to interfere with the branch wiring. All load centers shall have flush trim and shall be as manufactured by Square D, General Electric, I.T.E., or Westinghouse.

2.06 DISTRIBUTION SWITCHBOARD (400 Mass Ave.)

A. Furnish and install where indicated on the plans a dead front, metal enclosed, self-supporting switchboard of the required number of sections to form a complete structure incorporating (front connected) protective devices of the type, rating, and number shown on the plans with the necessary interconnections, instrumentation and control wiring.

B. Enclosure Construction - The switchboard framework shall consist of pre-punched commercial channels and formed steel, for equipment, cover plates and doors. All vertical sections shall be of the depth necessary to accommodate and connect the internal components. The sides, rear and top shall be covered with removable code gauge steel plates. Front plates shall be sectionalized and removable. Ventilation openings shall be provided where required. Adequate conduit space shall be provided to meet Massachusetts Electric Code requirements. The exterior and interior steel surface of the switchboard shall be paintd with gray enamel over a primer coat. The switchboard shall be provided with adequate lifting means.

C. Bussing - The bus shall be tin plated aluminum of sufficient cross section area to limit the temperature rise to 55 degrees. Bus arrangement shall be phase A-B-C left to right, top to bottom, and front to rear as viewed from the front of the switchboard. Main horizontal busses shall be braced for short circuit stresses up to 50,000 rms amperes-front accessible. All connections shall be tightly bolted. A ground bus shall be furnished to extend the full length of the switchboard as indicated on the plans.

D. Internal Components - The internal protective devices shall be front accessible and panel mounted. Main and branch protective devices shall meet the ampere ratings and interrupting capacities, as shown on the plans and be Underwriters' Laboratories labeled where applicable. All load terminals of all rear connected devices shall be bussed out to the rear of the switchboard, so that connections can be made without reaching across a line bus. All terminals shall be suitable for the type conductor used and be of the anti-burn type. All control wires shall be provided with terminal blocks with suitable numbering strips.

E. Switchboard shall be designed for 120/208 volts, 3 phase 4 wire.

F. Switchboard shall be as manufactured by Square D, Westinghouse, General Electric, I.T.E.

G. Minimum depth of switchboard shall be 36".

2.07 WIRING DEVICES

A. Duplex receptacles in apartments shall be Leviton 5014-I, Slater or P & S. Receptacles in Public Areas shall be Leviton 5252.

B. Switches shall be toggle type, Ivory color Leviton 54501-I, Slater, P &S.

C. Three-way switches in apartments shall be Leviton 54503-I Slater, P & S.

D. All devices shall be as specified or approved equal.

E. Range receptacles shall be 50A, 250 Volt, Circle F-3656 with 3552-D3 range cord, Leviton or approved equal.

2.08 WIRING DEVICE PLATES

A. All switch and receptacle plates shall be ivory plastic.

2.09 SAFETY SWITCHES AND FUSES

A. Furnish and install all safety switches wherever required. Switches shall be General Electric Type TH, Square D, I.T.E. Furnish and install all fuses as required throughout the job. They are to be of the time delay type, Fusetron, Chase Shawmut, General Electric.

2.10 CONDUIT AND RACEWAYS

A. Rigid steel Heavy Wall Conduit shall be of mild steel tube conforming to NEC, ASA, and UL specifications. The tubing shall be thoroughly cleaned, inside and outside, to remove all scale, rust and grease. A coating of zinc shall be applied to the exterior surface by an electro-galvanizing or equivalent process. A silicon base baked-on enamel shall be applied to the interior surface. Couplings and fittings shall be threaded and of the same manufacturer as the conduit.

B. Electric Metallic Tubing (EMT) shall be of welded steel construction and manufactured of light weight cold rolled steel. Fittings for EMT shall be of the set screw type. Manufacturer shall be in accordance with the Underwriters' Laboratories and shall bear their label.

C. Flexible Armored Conduit shall be constructed of continuous interlocking bands of zinc coated steel and shall be complete with fittings approved for this type of conduit.

D. Rigid Steel Conduit, EMT and Flexible Armored Conduit shall be equal to one of the following manufacturers: Allied Tube and Conduit Corp., General Electric Co., Youngstown Sheet and Tube Co., Republic.

E. Connectors for EMT and bushings for rigid steel conduit shall be cast ferrous alloy.

F. Conduit and EMT shall be one-half (1/2") inch minimum, unless otherwise noted on the drawings.

G. Connections to motors, adjustable or vibrating equipment shall be made with liquid tight flexible metal conduit finished grey. Flexible connections shall be made with No. 12 green grounding conductor.

H. Type NM cable (Romex) shall include separate insulated ground wire.

2.11 WIRES AND CABLES

A. All wire and cable work shall be copper or aluminum as indicated herein, in strict accordance with the requirements of the National Electric Code and its latest revisions, both with respect to materials and workmanship.

B. All branch circuit wiring shall be copper. The minimum size wiring for power and lighting branch circuits including apartment wiring shall be No. 14 AWG. Larger sizes of wiring shall be installed, so that the voltage drop between any lighting fixture and its lighting cabinet shall not exceed 1% where connected loads, as shown on the drawings and actual lengths of branch circuit runs as installed require its use. Minimum size for motor control wiring shall be No. 14 AWG.

C. Feeder wiring shall be Type THW and are shown on the drawings as copper. Sizes No. 4 and larger may be aluminum, if equivalent ampere capacities required for copper are maintained. All terminations of aluminum wire shall be made in accordance with the cable manufacturer's recommendations. Compression type fittings shall be used at all terminations. Compression tools shall be used for all terminations. Mac-Adapt type of fittings shall be used at all load center connections.

D. Branch circuit wiring, except as noted otherwise, shall have Type TW or Type R rubber insulation of code thickness for 600 Volts. BX cable, if used, may have Type R rubber. Insulation rated at 600 Volts.

E. Fixture wiring shall be THHN for 600 Volt service. Conductors shall be no smaller than No. 14 AWG flexible stranding, 2-conductor cable.

F. Wiring for low voltage systems shall have rubber insulation of code thickness for 600 Volt service, and shall be of coded colors.

2.12 LIGHTING FIXTURES AND LAMPS

A. Furnish and install lighting fixtures, complete with lamps, as indicated on the plans and as described in the fixture schedule.

B. The Electrical Sub-Contractor shall be responsible for the receiving, and safe handling of all lighting fixtures and lamps. He shall furnish all materials, equipment and labor required for the installation of all lighting fixtures and lamps. He shall provide all necessary fixture supports, toggle bolts, screws, etc. All fixtures shall be installed in a neat workmanlike manner. The Electrical Sub-Contractor shall assume all responsibility for all lighting fixtures, accessories and lamps, until the final inspection has been made by the Engineer.

2.13 OUTLETS

A. At outlets for concealed work provide galvanized pressed steel outlet boxes of standard make. These boxes shall in all cases be suitable for particular condition. In general, outlet boxes shall be at least four (4") inches in diameter. Boxes shall be as manufactured by Raco, Appleton.

B. The Electrical Sub-Contractor must see that all outlets are truly centered in panels and spaces provided therefore.

C. Wherever outlets of any system are installed in brick, masonry or concrete construction, the Electrical Sub-Contractor shall furnish and install the necessary suitable type boxes and conduit in connection therewith so that the General Contractor may build them in as the work progresses.

D. Lighting outlet boxes shall be four (4") octagonal with three-eighths (3/8") inch male fixture stud, minimum depth shall be two and one-half (2 1/1") inch. Concrete rings shall be installed as required. Bar hangers shall be installed for all outlet boxes in wood framed or furred ceilings.

E. Raised covers shall be installed wherever required for wall outlets.

2.14 TIME CLOCKS

A. Furnish and install all time clocks as indicated on the drawings. Time clocks shall be seven (7) day-24 hour with battery back-up. Time Star Model 101 or approved equal.

2.15 NAMEPLATES

A. Furnish and install engraved nameplates for motor switches, motor starters, time clocks, feeders, etc., to designate what they control. Nameplates shall be black mica with white core lettering.

2.16 JUNCTION BOXES

A. Junction and pull boxes shall be installed at all necessary points, wherever required. Minimum dimensions shall not be less than code requirements.

B. Boxes shall be constructed of galvanized sheet steel, code gauge, standard junction boxes and pull boxes.

2.17 MASTER ANTENNA TELEVISION SYSTEM (See drawings for Number of systems)

A. The work herein described includes furnishing and installing a television master antenna distribution system complete and ready to use. The system shall include all antennas, antenna mast, pre-amplifiers, mixers, amplifiers, power supplies, cable outlets and all other components necessary for the reception and distribution of the TV signals. All fillings, pads, terminators, filters, traps, etc. needed to provide the best performance possible and the latest state of the art, whether herein specified or not, shall be deemed part of the specification.

B. The contractor shall show satisfactory evidence upon request that he maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system, including standard replacement parts for the maintenance of this system during and after the guarantee period.

C. The contractor shall provide a set of operating instructions, circuit diagrams and other information necessary for proper installation, maintenance and operation of the system.

D. The contractor shall construct the system following the best engineering techniques for continuous operation in accordance with applicable codes and safety precautions. All equipment including wiring, cabling and outlets furnished and installed under these specifications, shall be guaranteed for a period of one year from the date of final acceptance thereof, against any and all electrical and mechanical defects or failures, except that which can be proved to have been caused by misuse or abusive treatment.

E. All service including labor and parts shall be provided by the contractor during normal working hours for the guarantee period. The contractor shall make service available at other than normal working hours at the then present labor rate.

F. The contractor shall provide the following with his submission: specifications and data sheets defining the essential components of equipment he proposes to use, printed illustrations, photographs or detailed drawings of components he proposes to furnish with detailed drawings showing equipment and signal levels.

G. The system shall receive the television signals by a set of appropriate antenna, further described in the specifications, amplify these signals and distribute these signals to all TV outlets to permit simple connection of EIA standard television receivers. The system shall provide at all outlets the best signal receivable in the area, resulting in reception that is equal or superior to that obtainable on the channels as further described in these specifications.

H. The system shall deliver at all outlets all monochrome and NTSC color television signals without introducing noticeable effect on intelligence and color fidelity. The system shall provide a minimum signal level of one millivolt across 75 ohms impedance on each channel at each television outlet.

I. The system shall be capable of simultaneous distribution of the VHF and UHF band over a single cable. This shall be possible by adding antennas, pre-amplifiers, amplifiers, power supplies and any other equipment as required. No distribution cable shall be necessary for any additional channels. The system and all the equipment shall be designed and rated for 24 hours a day continuous operation. All active components shall be solid state design. It is the intent of these specifications and system design to provide for the reception of channels 2,4,5,7,10,12,25,38,44,56 and 68.

Reception of these channels will be at least equal to that if individual outdoor antennas were provided for each television outlet. The system acceptance test will be to make a comparison of the pictures receivable from direct connection of a EIA STANDARD TELEVISION RECEIVER to the systems antenna with those pictures received at randomly selected outlets in the distribution network, using the same television receiver. The judgement of this comparison shall be the responsibility of the inspecting engineer. Any substitution of equipment or change of design, shall require the prior written approval of this engineer before any work shall commence.

J. The equipment herein specified shall be as manufactured by Macom Corporation, accept for antennas which shall be as manufactured by Winegard and as distributed by Nova Controls, Braintree. Mass.

K. Install VHF Broadband antennas where indicated. Each antenna shall have the following:

Elements	28
Boom Length	117"
Turning Radius	79"
Maximum Width	110"
Element Diameter	7/16"
Element Material	.025 38,000 PSI
Finish	Annodized Aluminum
Weight	12 lb.
Gain	10 db
Front to Back Ratio	20 db

Install UHF antennas where indicated. Each antenna shall have the following:

Elements	43
Boom Length	67"
Turning Radius	65"
Maximum Width	24"
Element Diameter	7/16"
Element Material	.025" 38000PSI
Finish	Anodized Aluminum
Weight	5 1/2 lbs.
Gain	14.9 db over reference dipole
Front to back ratio	17 at channel 50

L. Amplifiers shall be Macom Saturn 52 VHF-UHF 82 channel. Each amplifier shall have a maximum output of 60 dBmV onVHF and 55 dBmV on UHF. Supply (3).

M. Each outlet shall incorporate one (1) or more outputs as shown on the plan. The minimum isolation value between any two outlets shall be 12db and shall have thru loss of .8db and a return loss of 16 dbrl min. on VHF and 14 on UHF. Outlets shall be Macom FDP8 and shall mount on standard single gang boxes. Receptacles shall mount on coaxial cable without soldering or splicing. TV cover plates shall be supplied by the electrical contractor to match other duplex plates.

N. Line splitters shall have a frequency response 0-60 cps - 18 - 216, 470-890 MHz. The unit shall be of the hybrid design with a 75 Ohm match on input and outputs and a VSWR of not more than 1.45 and they shall be power passing in all directions. Two way line splitter shall have signal loss of not more than 3.6 db at VHF and 3.7 db at UHF at each output. Minimum isolation 23 db at VHF and 16 db at UHF. Macom DSU-2. Four way splitter shall have a signal loss of not more than 6.5 db at VHF and 6.9 at UHF at each outlet. Minimum isolation of 20 db at VHF and 12 db at UHF. Macom DSU-4.

O. Terminator shall be power blocking type capable of blocking DC power as well as providing precise 75 ohm impedance. Macom F59T.

P. Matching transformer/frequency splitters shall be provided for each apartment outlet. It shall have provision at the input for 75 ohm coaxial cable and separate 300 ohm outputs for VHF and UHF. Units shall be Macom BD-1, provide similar number 10 ft. lengths of coaxial cable with proper connections at both ends.

Q. System's coaxial cable shall be 82' channel 75 ohm. Size of coaxial cable shall be determined by systems layout. RGGU or RGIIU. Coaxial cables shall be run in continuous lengths except for terminations and no splices shall be permitted in any conduit run. Cables shall be installed to avoid sharp bends or any physical distortions. All cables terminating at amplifiers or splitters shall be tagged as to function and destination. All coaxial cables shall be manufactured within the six months period preceding installation. All coaxial cables used in this system shall have a nominal charateristic impedance of 75 ohms throughout the entire frequency spectrum utilized in this system. Each reel of cable shall be sweep-tested from 54 to 216 MHz and 470 to 890 MHz.

R. Provided appropriate size ventilated distribution cabinets constructed of a minimum of 16 guage CRS with front locking hinged door. All splitters shall be mounted on 16 guage panels. Provide (3).

2.19 APARTMENT INTERCOM SYSTEM

A. Furnish and install a TekTone series AM500 electronic amplified apartment house communications system. The AM500 system allows conversation between each apartment, for each building and the entry stations; it also provides for the release of the electric door lock.

B. Operation of any pushbutton on the entry panel by the caller sounds an electronic tone signal in the corresponding apartment. The tenant may talk and listen to the person originating the call. The tenant by operating the entry door button may release the electric door lock allowing the caller entry to the building.

C. Entrance panels shall be TekTone AM500 and shall contain as many pushbuttons as there are apartments or areas to be called. It shall also contain an alphabetical directory with provisions for all tenant names and numbers to be listed. The panel shall be flush mounted to an appropriate metal backbox and shall be finished in brushed natural extruded aluminum.

D. Amplifiers shall be TekTone PK104R. They shall contain the control amplification and power circuits to operate the system. The unit shall be housed in a rugged extruded aluminum case and have integrated circuit amplification. Call tone shall be integrated circuit oscillator with a frequency of 400 Hz.

E. Apartment station shall be TekTone 12207 and shall have rugged stainless steel panel and momentary action pushbuttons for Talk, Listen and Door operation. Speaker microphone shall be oval 3 1/2" x 2 1/2" 45 ohms. Dimensions - 4 1/2"H x 4 1/2"W and shall mount on 2 gang electrical box. Finish shall be satin brushed chrome steel.

F. Transformer shall be TekTone SS102 and shall be UL listed, CSA approved with internal thermal switch and shall mount in standard outlet box.

G. Dual entrance transfer relay shall be TekTone PK401 and shall be utilized in building (E) only. It shall enable the tenant to automatically converse with the appropriate entrance and release the appropriate door release.

H. Door opening shall be TekTone PO-001 and shall be 16V AC mortise type. It shall replace the door strike. This is a standard type door opener. If other than this type is required, it shall be provided by others and wired by the electrical contractor. All above equipment shall be as manufactured by TekTone, Lake Park, Florida, and as distributed by Nova Controls, Braintree, Mass.

2.20 EMERGENCY LIGHTING (395-397 & 588 Mass. Ave only)

A. The Electical Sub-Contractor shall furnish and install and wire the emergency lighting units in the buildings as indicated on the plans, including supports for same. Provide an outlet box at the unit and wire permanently to the lighting panel.

B. Emergency lighting system shall be fully automatic and comply with all state and local codes. Emergency lighting equipment shall be Model 12 BLH, as manufactured by Emergency Lighting and Systems, Inc., Hingham, MA, York or Chloride. Battery shall be lead calcium type powered by a solid state electronic charge capable of restoring battery to fully charged in 12 hours. Case shall be grey beige epoxy inside and out. Case shall be mounted on a wall with a #HB6 hanger bracket. Control panel shall consist of a voltmeter, high and low charge pilot lights, push to test button and an A.C. fuse. See drawings for voltage of units.

C. Lampheads shall be fully adjustable, locking swivel 12 Volt, 10 watts halogen lamps. ELS #RDQ-10.

2.21 EMERGENCY GENERATOR (400 Mass. Ave only)

A. Furnish and install a complete and operating emergency power and lighting system as specified herein and as indicated on the drawings.

B. The system shall be arranged to provide automatic and instantaneous emergency lighting upon failure of normal lighting in any of the supervised areas. This system shall meet all Code requirements for emergency lighting.

C. Furnish complete, install and leave in good running condition a 15 KW diesel fueled engine driven generating set continuously rated for standby service. The unit shall be hereinafter described and as shown on the Drawings, complete with all controls, attachments, accessories, fuel and exhaust systems.

D. The unit shall be the product of a manufacturer regularly engaged in the production of this type of equipment as manufactured by Consolidated Power,Inc., Catapillar, or Cummins or equal.

E. The unit shall be capable of accepting the incoming loads of the Automatic Transfer Switch.

F. Operation:

1. The operation of this unit shall be automatic and upon the closing of a remote starting contact in Automatic Transfer Switch, the engine shall start and attain rated voltage and frequency within ten (10) seconds.

2. All necessary accessories shall be provided to assure starting within the time described above under the ambient conditions described herein.

3. Furnish and install all electrical work and equipment required for the proper operation of this system. The General Contractor will provide the necessary structured supports for the emergency generator. The Electrical Sub-Contractor shall provide weight information, as well as dimensional information of the generator to the General Contractor, prior to installing the supports.

G. Engine:

1. The engine shall be water-cooled, 4 cylinder, 4 cycle, industrial type, heavy duty diesel fueled, with a minimum displacement of 162 cubic inches, and a minimum rated output of R.P.M. of 1800. Ratings shall be for standard conditions of 29.92 barometer and 60 degrees air temperature.

2. Lubrication shall be a full pressure system using an engine driven gear-type lube oil pump with replaceable element full lube oil filter. Oil cooler shall be required.

3. Fuel System, Diesel:
   a) The engine fuel system shall include all equipment normally supplied and recommended by the generator set manufacturer for standby generator service. The engine fuel system equipment shall include (but not be limited to) the following:

      -Fuel injection system -Fuel line solenoid valve -Flexible fuel connections

4. Governor:

   (a) The engine shall be equipped with a mechanical governor capable of maintaining the engine speed from no load to full load within 5 percent of the synchronous speed.

5. Starting System:

   (a) The engine shall have a 12 V.D.C. starting motor and starter solenoid switch.

   (b) Batteries - One (1) set of starting batteries with cables and steel battery rack, shall be included: batteries shall be heavy duty lead acid type, rated 70 hours.

   (c) Float type battery charger shall be supplied to maintain the starting batteries at full charge. The charger shall be suitable for wall mounting (or may be mounted in the generator control panel) and shall have a cranking disconnect relay or current limiting feature. The charger shall be LaMarche. Battery charger shall be prewired to generator terminal strip prior to shipment.

   (d) There shall be a belt drive battery charging alternator with regulator and charge rate ammeter for charging the batteries while the engine is running or the float type battery charger may be arranged to charge the batteries from the normal source when the engine is shut down and from the generator output when the generator is operating. This shall be accomplished by a relay energized from the generator output.

6. Jacket Water Heater:

   (a) A 1500 watt engine jacket water heater shall be provided to maintain the engine jacket water at a temperature high enough to assure starting the engine and attaining rated voltage and frequency within ten (10) seconds. The jacket heater shall be of the capacity recommended by the generator set manufacturer to meet the above conditions. Input voltage to the heater shall be 120-1-60.

7. Engine Cooling System:

   (a) The engine shall be equipped with a unit mounted radiator cooling system complete with unit mounted radiator, circulating water pump, by-pass thermostat, and radiator belt guards. The radiator shall be supplied to operate in an ambient temperature of 110 F.

   (b) The cooling system shall be filled with a 50% solution of ethylene glycol and water.

8. Safety Shutdowns:

(a) The engine shall be equipped with safety contacts for:
Low lube oil pressure -High jacket water temperature-Overspeed -Overcrank

9. Engine Instruments:

(a) The following engine instruments shall be included either in an engine instrument panel or in the generator control panel:

-Lube oil temperature -Lube oil pressure
-Water temperature -D.C. ammeter

Any other instruments considered necessary by the manufacturer shall be included.

10. Exhaust System:

a) A high degree exhaust silencer suitable for residential type silencing complete with condensate drains shall be supplied of the size recommended by the generator set manufacturer, but in no case less than 1 1/2 inches. Silencer shall be as manufactured by Kittell, Maxim or Burgess Manning. An octave band center frequently in Hertz data sheet shall accompany all muffler shop drawings. A section of seamless, flexible stainless steel exhaust connection of the size and type recommended by the generator set manufacturer, but in no case less than 1 1/2 inches in diameter and eighteen (18) inches long. If the engine is Vee type, a single exhaust outlet header shall be supplied.

11. Mounting:

(a) The engine and generator shall be close coupled and mounted on a structural steel base designed to maintain proper alignment of the unit.

(b) The unit shall be certified by the manufacturer to be free from any critical torsional vibrations within a range of plus or minus 10 percent of synchronous speed.

(c) Vibration isolators of the rubber pad type shall be supplied with the unit. The number of isolators shall be as recommended by the generator set manufacturer.

(d) Vibration isolators shall be Korfund MMB series or equal by Consolidated Kinetics or Vibration Eliminator.

H. GENERATOR

1. Rating - 15 KW, 18.75 KVA, 0.8 P.F., 3 phase, 60 cycle, 120/208 volts.

2. Type - Revolving field, 4 pole, single bearing, drip-proof.

3. Exciter - brushless, direct connected, fully tropicalized, SCR rectifiers, static voltage regulator, rheostat, excellent motor starting capability.

4. Voltage Regulation - Plus or minus 1% of any preset value over the three (3) phase load range. Instantaneous voltage dip or rise when measured with an oscillioscope, will not exceed 20% upon full load application or rejection, and will return to preset value within 0.5 seconds.

5. Waveform - Deviation factor of output voltage will not exceed 5% and the value of any individual harmonic will not exceed 2% of the fundamental when operating with an unbalanced load.

6. Temperature Rise - Temperature rise of any component will not exceed the rise permitted by NEMA Standards.

7. Rotor - One (1) piece laminations welded and secured to shaft by a key and press fit. A mortisseur windings installed and connected between poles as an aid to paralled operation and improved wave form during unbalanced loads. Field coils machine wound on insulated pole body and securely braced. Rotor statically and dynamically balanced.

8. Stator - One (1) piece laminations welded together. Stator coils form wound and placed in insulation slots. Stator pressed and welded in a rigid steel frame.

9. Bearing - Double sealed ball bearing, lubricated for life.
10. Insulation - NEMA Class F insulation.
11. Varnish Three (3) coats modified polyester type, will not support fungus growth.

12. Cooling - Cast aluminum fan mounted on generator shaft.

13. Radio Suppression - Radiated or conducted radio

interference will not affect normal commercial apparatus.

14. Controls:

(a) (Unit Mounted) the engine generator set shall include a combination engine generator control panel shock mounted at the generator end of the unit. This unit mounted panel shall include (but not be limited to) the following:

Water temperature gauge -Oil pressure gauge

D.C. battery charge rate ammeter -A.C. voltage regulator

Voltage adjusting rheostat -Start-stop switch

A.C. voltmeter, 3 1/2" diameter, 2% accuracy

A.C. ammeter with current transformers, 3 1/2" diameter, 2% accuracy

Combination VM-AM phase selector switch

Frequency meter, 3 1/2" diameter

Elapsed time meter, 3 1/2" diameter

Automatic start-stop control with faulty indicating lights and corresponding safety switches for: -Low oil pressure

Overcrank protection (manual reset)

High water temperature
Low water temperature -Overspeed -Overcrank
Selector switch - "off, auto, manual" with light for "selector switch off"

2 Manual reset line circuit breakers, 3 pole, 120/208V 30 amp., mounted in NEMA I enclosure with an interrupting capacity of 22,000 amps, sym. at 240 volts.

(b) The control shall be designed to start the engine upon a closure of a remote contact, arm all safties, and shutdown the engine when the remote contact is re-opened.

(c) The control must be manually reset following any fault condition.

(d) Control power shall be from the engine

start battery.

I. Derangement Panel - Weatherproof Housing

1. A flush remote mounted engine generator derangement panel shall be built, tested and supplied by the generator supplier. The derangement panel shall monitor, visually and audibly, the following:

-Generating (visual only) -High water temperature

-Low oil pressure

-Overspeed -Overcrank

-Alarm silenced (visual only) -Panel mounted alarm
-Alarm on/off switch

2. The complete engine generator set shall be housed in a weather protective enclosure with floor plate, fixed louvres and hinged lockable doors. Housing shall be complete with silencer, day tank, battery charger, etc., mounted piped and prewired to terminal strips. Housing shall be ASA 61 grey finish.

K. Automatic Load Transfer Switch:

1. Automatic transfer switches shall be furnished, with full load current rating of 30 amperes, 120/208V, 3 phase, 4 wire, 60 hertz, A.C. normal and emergency. The transfer switch shall be capable of switching all classes of load, and shall be rated for continuous duty when installed in a non-ventilated enclosure that is constructed in accordance with Underwriters' Laboratories, Inc., Standard UL-1008.

2. The transfer switch shall be double throw, actuated by a single electrical operator momentarily energized; and connected to the transfer mechanism by a simple overcenter type linkage with a total transfer time not to exceed one-half (1/2) second. The transfer switch shall be capable of transferring successfully in either direction with 70% of rated voltage applied to the switch terminals.

3. The normal and emergency contacts shall be

3. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in position in both the normal and emergency positions without the use of hooks, latches, magnets or springs; and shall be silver-tungsten alloy protected by arcing contacts, with magnetic blowouts on each pole.
4. The transfer switch shall be equipped with a manual operator that is designed to prevent injury to the operating personnel, if the electrical operator should suddenly become energized during manual transfer. The manual operator shall provide the same contact-to-contact transfer speed as the electrical operator to prevent a flash-over from switching the main contacts slowly.

5. Engine starting contacts shall be provided to start the generating plant, if any phase of the normal source drops below 70% of rated voltage, after an adjustable time delay period of three (3) to thirty (30) seconds, to allow for momentary dips. The transfer switch shall transfer to emergency, as soon as the voltage and frequency have reached 90% of rated voltage. After restoration of normal power on all phase to 90% of rated voltage, an adjustable time delay period of 0-30 minutes shall delay re-transfer to normal power, until it has had time to stabilize. If the emergency power source should fail during the time period, the time delay shall be by-passed, and the switch shall return immediately to the normal source. After the switch has retransferred to normal, the engine generator shall be allowed to operate at no load for an adjustable period of time (0.5 minutes) to allow it to cool before shut down. The transfer switch shall include a test switch to simulate normal power failure, pilot lights on the cabinet door to indicate the switch closed on normal or emergency and four (4) auxillary contacts on the main shaft; two (2) closed on normal, the other two (2) closed on emergency, and an engine exercisor with load/no load selector switch.

6. Load transfer switches shall be as manufactured by ASCO, Westinghouse, or Russelectric.

L. Test:

1. The supplier of the equipment shall provide with no additional charge any information or supervision required for the proper installation of the equipment. Upon completion of the installation of this unit a test run for four hours shall be conducted by the equipment manufacturer's factory trained serviceman, utilizing load banks to attain full generator rating. At this time adjustments shall be made for correct operation of the equipment and the following readings taken at 15 minute intervals:
   (a) Engine Jacket Water Temperature
   (b) Generator Temperature
   (c) Oil Pressure
   (d) Battery Charge Rate
   (e) A.C. Volts
   (f) A.C. Amps (all legs)
   (g) Engine Air Exhaust Temperature
   (h) Engine Oil Temperature

2. A second test shall be made by utilizing available connected load. The supplier of this equipment shall also furnish and install lube oil in the engine and also drain and refill the engine with new lube oil after the engine-generator test has been completed. If the engine-generator unit should fail this initial test run, as determine by the representative of the Owner, after proper corrective measures have been implemented, replace engine lube oil again after the second test. If any additional tests are required to prove the performance of the engine-generator unit, lube unit, lube oil shall be replaced after each such test run.

3. Prior to shipment of generator to the job site, conduct a 3 hour full load shop test utilizing resistive load to attain full rated load. A written report of this test shall be forwarded to the Engineer for approval prior to shipment. All expense for these tests shall be carried by the Electrical Sub- Contractor. Notify engineer one (1) week prior to shop test. Shop test may be witnessed.

2.22 FIRE ALARM SYSTEM

A. WORK INCLUDED

1. Non-coded Fire Alarm System

2. Electrical Contractor to provide a separate fire alarm system for each building.

B. REQUIREMENT OF REGULATORY AGENCIES

1. The system shall be in total compliance with all City of Boston building and safety codes of the Fire Department and other agencies having jurisdiction.

2. All components shall be listed by Underwriter's Laboratories for fire alarm signaling use. In addition, all automatic initiating devices, audio or visual indicating appliances and all components of the evacuation system shall be cross listed with UL by the manufacturer of the control panel for a complete and operable "system."

C. SUBMITTALS

1. 15 days or less at the award of the contract the system supplier shall provide eight sets of system shop drawings. The submittals shall be complete in all repects and as minimum shall include the following:

a. A system operating description designed to verify the comprehension of the specifications, and to outline the proposed operation for the authority having jurisdiction (AHJ).

b. Complete descriptive literature for each component of the system.

c. Computations of all voltage drop, wattage (amplifier and/or power supplies), standby battery calculations, zone descriptions of alarm and initiating zones.

d. UL listing numbers.

e. Complete system drawings for this specific system. The drawings shall include: floor plans showing each device with conduit runs and interconnect wiring diagrams. In addition, the manufacturer of the control panel shall include a note on the drawings

which verifies the fact that the type and quantity of devices shown on the drawings are compatible with the specific control panel for this project.

f. It is the reponsibility of the system supplier to verify to all concerned that the submitted system is in strict accordance with all authorities.

D. QUALITY ASSURANCE

1. These specifications are intended as a performance guideline for manufacturers of Fire Alarm "Systems."

2. The "system" specified is manufactured by Mirtone Industries, Inc., with local offices at the Dawson Industrial Park, 54 Brigham Street, Marlboro, MA 01752, and is intended to indicate the specified level of quality and performance.

3. Other "system" manufacturers:

   a. Autocall

   b. Pyrotronics

   c. Simplex

E. OPERATION

1. The contractor shall furnish and install a complete and operable system.

2. It is the contractor's responsibility to coordinate with other trades as required to ensure proper and adequate interface to the various sub-systems of this project. Specific interface may occur for Fan/Smoke control, Fire Protection System Valve Supervision and Waterflow Indication devices. All fan relay control/override devices shall be an integral component of the "system."

3. The initiation of any automatic or manual initiation device will simultaneously:

   a. Indicate the stricken zone on the system

annunciator.

b. Indicate a common audio/visual alarm at the Fire Command location specified and shown on the drawings.

c. Actuate a central station reverse polarity relay module.

d. Sound the evacuation alarm over all devices.

e. Flash the alarm lamps of all audio/visual devices.

f. Control all fans and dampers as required by the specifications, drawings, and the AHJ.

g. Actuate the beacon on the outside of the building.

4. Any system derangement such as the closing of a sprinkler valve supervisory switch, or other disarrangement in the electrical supervision of this system shall initiate a distinct audio/visual trouble indication at the system control panel and at the location of the common alarm annunciator.

5. The control panel shall incorporate 8 active and 2 spare zones. Zone designations as indicated on drawings.

F. EQUIPMENT

1. Controls:

a. The control unit shall be modular, of dead front construction, using solid state construction, to operate the system. All input and output circuits shall be totally field programmable without modification to, or replacement of, the programmable read only memory (PROM'S) of the control panel. Any program change to these specifications must be by written authorization of the Fire and/or Building Departments. The system control panel shall be complete with all power supplies, relays and matrix switches required for a complete and operable system. The control unit shall contain as a minimum, the following features: Internal audio/visual alarm and trouble indication, with silence switch and ring-back feature, separate

Silence, and Reverse Polarity Module. The control unit shall be fully supervised.

b. Separate amber trouble indicators shall be provided for each zone circuit, alarm circuit, ground detector circuit, etc. A second "common" indicator shall be provided for redundancy. Any trouble condition shall cause the audio trouble indicator to sound steadily and the circuit indicator light shall flash until the acknowledge switch is activated at which time the indicator light will glow steadily. When the trouble has been cleared, the trouble indicator will automatically extinguish.

c. THE SILENCING OF ANY ALARM OR TROUBLE CONDITION WILL NOT PREVENT THE RESOUNDING OF SUBSEQUENCE ALARM OR TROUBLE SIGNALS.

d. All switches shall be "key" controlled to preclude unauthorized use. All alarm initiating circuits shall be class "B", unless otherwise noted. All end-of-line devices shall be identified by type and location on the "system" drawings. Each initiating zone (circuit) shall include individual alarm and trouble indicators per zone.

e. The alarm circuits of this system shall be powered by continuously supervised power supplies. The system shall include sufficient power to power all signals specified elsewhere in this specification, and have sufficient capacity for an additional 20% spare capacity. All components shall be rated for continuous duty and be capable of operating the system at full load indefinitely without component failure. The alarm zones shall consist of six (6) alarm circuits, rated at 2.5 amps per circuit. The system shall be capable of supplying up to nine (9) amps of auxilliary power for future use and as specified elsewhere in these specifications.

f. Systems which, by design, do not have this capability shall require multiple power supplies. All interconnect wiring between modules and between cabinets shall be by the manufacturer, and be accomplished during factory assembled in order that the manufacturer's Quality Control Department test the controls for this project in its entirety prior to shipment. The Fire Alarm Control

Panels for this project shall be Mirtone Type 790.

3. REMOTE RELAYS

Install a remote damper control relay on each floor. The relay shall be triple pole, double throw, with a minimum contact rating of 10 amp @ 120VAC, 60Hz, and 24VDC coil voltage. The relay shall be provided with terminal strips and enclosure for installation at or near the floor dampers. Relays shall be Mirtone type QST311.

4. ALARM SIGNALS

a. Alarm indicating appliances used in conjunction with audible alarms shall be combination audio/visual horn/lamb units installed on supervised circuits. Visual portion shall flash on alarm condition. Audio/visual units shall be Mirtone U74213.

b. The exterior unit shall be a weatherproof horn only. Mirtone type U74310U with U74216 weatherproof back box.

5. MANUAL FIRE BOXES

a. Manual fire boxes shall be non-coded and shall be semi-flush mounted. Stations shall be single action. When operated, fire boxes shall remain mechanically locked until manually reset. Manual fire boxes shall be Mirtone type 73204.

6. AUTOMATIC DETECTORS

a. Automatic heat detectors shall be fixed temperature type only. When actuated on the fixed-temperature limit, units shall be non-restorable and give visual evidence of such operation. Heat detectors shall be Mirtone type 73331 (FT only).

b. Wet pipe sprinkler risers shall have vane-type sprinkler flow switches and valve tamper switches shall be wired by the Electrical Contractor and furnished and installed by the Sprinkler Contractor.

c. Automatic photoelectronic smoke detectors shall be of the solid state photoelectronic type and shall be factory-set at a nominal 3.0% light obscuration per foot, regardless of the rate of combustion, the distance between the detector and the fire source, the combustible material, the temperature, or the open area. Detectors shall be designed to ignore invisible airborne particles or smoke densities that are below the factory-set point. A visual indication of an alarm shall be given when the normally-pulsed supervisory LED glows continuously. Automatic photoelectronic-type smoke detectors shall be two-wire Mirtone type PSD-7121/001.

7. DETECTORS WITHIN APARTMENT UNITS

a. Detectors within each dwelling unit shall be ceiling mounted and located as shown on the drawings or on the approved shop drawings except units shall not be installed in front of airconditioning diffusers.

b. Interconnect all detectors within a dwelling unit, so that all units will sound the alarm when any one unit is activated.

c. Each unit shall have a solid state indicator lamp (LED) which glows when 120VAC power is being supplied.

d. Each unit shall have a special switch to permit periodic checking for proper sensitivity and operation. The switch shall stimulate entry of smoke, creating an alarm.

e. Detectors shall be Model 305MX series, as manufactured by Pyrotector.

8. Remote Annunciator

a. The remote annunciator shall be flush mounted, back lit, with brushed stainless steel with white through black labels, trouble buzzer, trouble silence, and lamp test. Mirtone Model 74376, with 74372 back box. In addition the annunciator shall incorporate as internal components outlined in 5 d.

9. Exterior Beacon

a. Exterior strobe/beacons shall be mounted as shown on the drawings. The strobe shall operate at 24 VDC, incorporate a red lens, flash at 60 to 100 BPM, and 90,000 candle power. Mirtone type SL-IL.

10. Operating Power

a. Operating power shall be 120VAC taken from a supply circuit having a continuous unfused conductor.Standby battery and charger shall be furnished to sound alarms for a period of ten (10) minutes after a sixty (60) hour interruption of 120 VAC. While on battery power, the control unit shall continue to supervise all installation wires as specified herein. While AC power is on, the control unit shall supervise the presence of battery power.

b. Disconnecting emergency power from the control unit shall cause the control panel audible sound to steady, and common trouble indicator to light, and a separate battery trouble indicator to flash. When the panel audible acknowledge switch is activated, the control panel audible will silence and the battery trouble indicator shall go steady.

G. TEST, GUARANTEE, AND DRAWINGS

The contractor shall conduct tests of the system in the presence of the owner or his agent. All material and installation shall be guaranteed to be free of defects in material and workmanship for one (1) year. The contractor shall turn over to the owner system wiring diagrams and maintenance data.

H. INSTALLATION

Install in strict accordance with approved shop drawings and as required to meet all requirements of local authorities. Final installation shall be totally acceptable to all local authorities.

I. CONTRACT FOR SERVICES

The contract for services shall be in strict accordance with the most recent City of Boston Fire Alarm Regulation #1, dated June 1, 1985.

PART 3 EXECUTION

3.01 GENERAL

A. The Electrical drawings intend to show only the scope of the design; and the Electrical Sub-Contractor shall be responsible for the correct installation of his work in a manner satisfactory to the best practice of his trade, and to complete the scope of this sub-contract in all respects. All roughing to Electrical equipment and other equipment furnished under other Sections of this specification shall be accomplished in all details to specification of equipment manufacturer, and to approval of Architect; no roughing work shall be accomplished, until the pertinent manufacturer's shop drawings are approved by the Architect.

B. The Exact routing of conduit shall be determined by the structural conditions and other obstructions. This shall not be construed to mean that the design of the system may be changed, but refers only to the exact runs of conduits between given points.

C. The Electrical Subcontractor shall consult all contract drawings which may affect the locations of any outlets, apparatus and equipment to avoid all possible interference and permit full coordination with all work. The right to make any reasonable change in location of outlets, apparatus, or equipment up to the time of roughing-in is reserved to the Architect. Such changes shall be made without additional cost to the Owner.

D. It shall be the responsibility of the Electrical Sub-Contractor to see that all electrical equipment, such as junction boxes, panelboards, pull boxes, switches, controls and such other apparatus as may require maintenance and operation from time to time is made accessible.

E. The Electrical Sub-Contractor shall maintain at the site a set of drawings on which shall be accurately shown the actual installation of all work under this Division, indicating thereon any variations from the contract drawings. This shall include changes in locations and dimensions. The Owner will furnish two (2) sets of black or blue line on white drawings for that purpose. At the conclusion of the work, the Electrical Subcontractor shall deliver to the General Contractor a complete set of reproducible record drawings of photolitho reproductions showing the entire work as actually installed and two (2) sets of black or blue line on white prints thereof. These

prints shall be submitted to the Architect.

3.02 SLEEVES, OPENINGS, ETC.

A. The Electrical Subcontractor shall keep himself fully informed as to the shape, size and location of all openings required for his equipment and shall give full information to the General Contractor and other sub-contractors sufficiently in advance of the work, so that all openings may be built in advance.

B. He shall furnish all sleeves, supports, etc., so that the General Contractor may build same in place.

C. In the case of failure on the part of the Electrical Sub-Contractor to give proper information as noted above, he will be required to do his own cutting and patching or have same done by the General Contractor at his own expense.

3.03 CIRCUITS

A. The lighting and power systems shall be complete from panelboards to all lighting fixtures, switches, convenience outlets, exhaust fans, motors, starters, and such other items of work. This shall include all conduit conductors, fittings, boxes, supports, and accessories to complete the system in every detail.

B. Circuits are indicated on the drawings by single lines and are generally numbered for identification purposes only. However, no circuit shall be loaded more than shown on the drawings, in order to avoid excessive voltage drop, and overloading of circuit breakers. The various loads shall be balanced among the phases as evenly as possible.

C. Lighting circuits shall be wired in such a manner that the grounded neutral wire shall not be broken at any point and switches shall be inserted only in the ungrounded wire of the circuit.

3.04 CONDUIT INSTALLATION

A. In general, the term conduit shall be interpreted as follows: Rigid steel conduit, zinc coated, shall be used for all underground conduit, and for concealed work in concrete slabs. Rigid steel conduit or electrical metallic tubing shall be used for exposed work. PVC style 40 may be used for underground work, if encased in concrete.

B. BX or Romex shall be used for all branch circuit wiring as described in the Mass. Electric Code and if

approved by the Electrical Inspector.

C. All grounding connections shall be made, so that the ground will be continuous for the entire Electrical System. All wiring shall be run concealed.

D. All exposed conduit shall be installed in a rigid manner and run straight lines either vertical, parallel, or perpendicular to ceiling walls. Insofar as practicable, the conduit shall be located in accordance with the drawings which show diagrammatically approximate locations.

E. All conduit ends shall be plugged with metal plugs as soon as they are installed to prevent entrance or moisture, or plaster during construction. No conduit smaller than one-half (1/2") inch electrical trade size shall be used.

F. No wire shall be pulled into any conduit, until the conduit system is complete in all details, in case of concealed work, in the case of exposed work, until the conduit has been complete in every detail.

G. All conduit shall be kept at least six (6") inches away from flues, heating devices, and such other similar equipment where closer proximity might impair the service life of the wiring. All interference with other piping shall be avoided. Conduit shall be manufactured by Allied Tube & Conduit Co., General Electric, or Republic.

3.05 WIRING FOR HEATING, VENTILATING AND PLUMBING

A. Check with the Heating, Ventilating and Plumbing Drawings and Specification. Obtain all pertinent information relating to all equipment, and do all necessary power and control wiring as required.

B. Exhaust fans will be furnished and installed by the Heating and Ventilating Sub-Contractor. The Electrical Subcontractor shall furnish and install switched with overload protecton, do all wiring including final connections.

C. Disposals and dishwashers where shown, will be furnished and installed by the Plumbing Sub-Contractor. The Electrical Subcontractors shall furnish and install all switches and make all final connections.

D. Furnish and install fused and unfused safety switched for all Mechanical equipment wherever required.

E. Provide all power wiring for the roof top condensing units and all interlocking wiring between condensing units and respective AC units in apartments.

F. Provide all wiring for all washers and dryers.

G. Provide all power for Boiler Room equipment.

H. All temperature control wiring will be by the HVAC Sub-Contractor.

I. Provide all wiring for all circulating pumps and Garage sump pump.

J. Provide all wiring for ranges and range hoods.

K. Provide wiring for fire pump - 400 Mass Ave.

3.06 COMPACTOR

A. All wiring for the Compactor equipment shall be furnished and installed by the Electrical Sub-Contractor, as indicated on the Drawings. Each apartment has a compactor.

3.07 EXTERIOR LIGHTING

A. See Electrical Site Plan for extent of site lighting.

B. Furnish and install the complete system of exterior lighitng including all building lighting and pole mounted units. Furnish and install all luminaires, lamps, mounting supports, poles, anchor bolts, conduit, wire and time clocks as required.

3.08 ELEVATOR WIRING

A. The Electrical Sub-Contractor shall furnish and install all wiring as indicated and as required for the Elevators.

3.09 GROUNDING

A. Furnish and install a service ground to the incoming cold water service pipes at point of entrance to both buildings. All grounding shall be in accordance with the Mass. Electric Code and local inspection requirements.

3.10 SERVICE

A. The Electrical Subcontractor shall check with Boston Edison and make all necessary arrangements for the electric service.

B. The Electrical Sub-Contractor shall furnish and install the (2) 4" conduit from the property line to the transformer.

C. Boston Edison will furnish and install the primary cable and make all connections.

D. The Electrical Sub-Contractor shall check with Boston Edison and pay all charges assessed by them for their work.

E. The Electrical Sub-Contractor shall cooperate fully with Boston Edison and coordinate the work and provide for a satisfactory installation.

F. The Electrical Sub-Contractor shall furnish and install all secondary cables and shall include all terminal lugs as required for paralleling the secondary cables. Final connections shall be made by Boston Edison.

G. All transformer grounding shall be made by the Electrical Subcontractor in accordance with Boston Edison's standards.

3.11 TELEPHONE SERVICE

A. Conduit and sleeves shall be installed wherever required. Check with the Telephone Co. Provide raceways throughout, except in those areas where the Telephone Co. will provide prewiring.

B. P.V.C. duct, heavy wall, style 40, shall be furnished and installed by Electrical Sub-Contractor as required by the Telephone Co. for the telephone services.

C. The Telephone Co. will terminate their wiring in each apartment in an SNI box. All work beyond the SNI box will be the responsibility of the Electrical Sub-Contractor.

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